APPENDIX B

OU1 SOIL BORING LOGS

(Provided on CD)

MACTEC

Project:	Olin Chemical Superfund Site
Location:	WILMINGTON, MA
Client:	OLIN
Boring:	SB-400
File No.:	

Contractor:	ZEBRA
Operator:	E. PLANK
Logged By:	T.D. LONGLEY
Checked By:	CTM
Date Start/Finish:	BOTH 8-26-09
Boring Location:	~~SHED~~ BUTLER BLDG.
Ref. Elevation[1]:	
Drilling Method:	GEOPROBE/HAND & TRACK RIG
Bore Hole ID/OD:	1.58"/2"
Auger ID/OD:	NA
Sampler:	T.D. LONGLEY
Hammer Wt./ Fall:	NA
Water Level[3]:	NA

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
wwh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Drive/Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
1'	S-1 0-1.0	1.0/1.0	13:23	Yellow brown, fine SAND, tr. gravel to 0.5', clean below	SP	Y	
	OC-SB-400-0.0/1.0-XXX		13:25	loose, dry, V. well sorted FILL / DISTURBED			
				LAST 1" IS gray f. SAND PID=0			
4'	S-2 1'-4'	3.0/2.2'		Gray to yellow brown, fine SAND, V. well sorted, med. dense, dry, non-plastic, stratified, ALLUVIUM PID=0	SP		
7'	S-3 4'-7'	3.0/2.0	13:30	As Above to 6.2'	SP	Y	
	OC-SB-400-5.0/7.0-XXX		13:30	6.2'-7.0 - whitish & black, "bleached" (naturally) V. Fine SAND, tr. to little organics possibly, Dry to damp			
				LAST 0.4' V. dark reddish brown f. SAND, Dense, Fetish			
11'				Refusal To HAND Geoprobe @ 7' USED Track Rig From 7'-11' V. Bad recovery - sleeve got distorted; Reddish brown Fine SAND TO ~? followed by dark yellowish brown SILTY Fine SAND, WET, V. Firm, ALLUVIUM	SP		
				B.O.B. @ 11' REFUSAL TO DRILL EQUIP.			

Notes

AT POOR RECOVERY OF 7'-11' Zone, Changed Rigs to use TRUCK-MOUNTED GEOPROBE.
Could only go to 8' with this Rig due to CAVE-IN.
DISCUSS W/ CHRIS MAZZOLINI - decide NOT TO COLLECT Sample - Call REFUSAL HERE.

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-400
File No.:

Contractor: ZEBRA
Operator: Jason Fredericks
Logged By: Jerry Rawcliffe
Checked By: Chris Manville
Date Start/Finish: 9/18/09
Boring Location: Area 6
Ref. Elevation[1]:

Drilling Method: Direct Push
Bore Hole ID/OD: ~~Terra~~ 1 7/8" / 2 1/2"
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ≈ 6' BGS based

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Sleeve #1 0-5	1.6	1030	Concrete slab 0 - 0.7 PID=0 0.7-2 light brown fine to coarse sand and gravel. Dry to moist. (slab subgrade) =0.1	SW		
				2-5 Brown to dark brown fine to medium sand with a little coarse sand and little to trace of gravel. Moist =0	SP/SW		
	Sleeve #2 5-10	3.0	1035	5-6 Brown to dark reddish brown to very dark brown fine to medium sand very moist to wet, stratified - very dark brown to black layers @ 5.5-5.6 PID=0 =0	SP		
				6-10 Reddish brown to brown fine to medium sand. Wet, massive with gradual color change from the reddish brown/dark reddish brown to brown. =0	SP		
	Sleeve #3 10-15	3.4	1045	10-14.5 Brown fine to medium sand with a trace of gravel. Wet, stratified. very uniform grain size. PID=0	SP		
				14.5-14.7 Brown fine sand with a trace of silt =0.1 Wet, well stratified with stone thin 2-4 mm s/s layers.	SP/SM		
				14.7-15 Brown medium sand with some fine sand and traces of coarse sand. Wet. =0.3	SP/SM		
				=0.5	SP		

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Boring: SB-400

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin

Boring: SB-400
File No.:

Contractor: ZEBRA	Drilling Method: Direct Push
Operator: Jason Fredericks	Bore Hole ID/OD: 1 5/8" / 2 1/2"
Logged By: Jerry Rawcliffe	Auger ID/OD: NA
Checked By: Chris Marcolin	Sampler: Dave Chapman
Date Start/Finish: 9/18/09	Hammer Wt./ Fall: NA
Boring Location: Area 6	Water Level[3]: ±6' BGS based on soils observation
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Sleeve #4 15-20	3.1	1055	15-18 Brown medium to coarse sand with a trace of fine sand. Wet. Possible very faint organic odor. PID=1.1 18-19 Olive to olive brown fine to coarse sand and gravel with a trace of silt. wet, massive (Till) =1.3	SP	YES	
20	OC-SB-400-17/19-xxx		1100	19-20 Gray fine to coarse sand and gravel with a little to some silt and traces of cobbles. =0.1 Wet, massive	GW/GM		
				Started getting very hard at 19' BGS Refusal at 20' BGS Bottom of boring = 20' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project:	Olin Chemical Superfund Site
Location:	WILMINGTON, MA
Client:	OLIN
Boring:	SB-401
File No.:	

Contractor:	ZEBRA
Operator:	E. PLANK
Logged By:	T.D. LONGLEY
Checked By:	CTM
Date Start/Finish:	BOTH 8-26-09
Boring Location:	~~BUTLER BUILDING~~ OFFICE-LAB
Ref. Elevation[1]:	
Drilling Method:	GEOPROBE/HAND PORTABLE RIG
Bore Hole ID/OD:	1.58"/2"
Auger ID/OD:	NA
Sampler:	T.D. LONGLEY
Hammer Wt./ Fall:	NA
Water Level[3]:	NA

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wsh = weight of 140 lb. hammer
war = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Drive/Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
1'	S-1 0-1.0	1.0/1.0	12:27	gray to yellow brown, fine SAND, V. well sorted loose, dry, non-plastic, stratified, fill/disturbed PID=0	SP	Y	
	OC-SB-401-0.0/1.0-XXX		12:30				
4'	S-2 1.0-4.0	3.0/1.6	12:34	Gray brown to 1.3' FILL 1.3'-4' - yellow brown, fine SAND, v. well sorted, loose, dry, non-plastic, stratified Alluvium - natural PID=0	SP		
7'	S-3 4.0'-7.0	3.0/3.0		Yellow brown fine SAND, V. well sorted, med. dense, non-plastic, dry to 6.8', then damp, stratified ALLUVIUM PID=0	SP		
9.5	S-4 7.0-9.5	2.5/2.5	12:45	Gray to yellow brown, fine SAND, damp to 8.5', wet to 9.5', STRATIFIED ALLUVIUM PID=0	SP	Y	
	OC-SB-401-7.5/9.5-XXX		12:45				
				B.O.B. @ 9.5' REFUSAL TO DRILL EQUIPMENT			

Notes

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MACTEC

Project:	Olin Chemical Superfund Site
Location:	WILMINGTON, MA
Client:	OLIN
Boring:	SB-402
File No.:	

Contractor:	ZEBRA	Drilling Method:	GEOPROBE/HAND PORTABLE RIG
Operator:	E. PLANK	Bore Hole ID/OD:	1.58" / 2"
Logged By:	T.D. LONGLEY	Auger ID/OD:	NA
Checked By:	CTM	Sampler:	T.D. LONGLEY
Date Start/Finish:	BOTH 8-26-09	Hammer Wt./ Fall:	NA
Boring Location:	BUTLER BUILDING OFFICE-LAB	Water Level[3]:	NA
Ref. Elevation[1]:			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wsh = weight of 140 lb. hammer
war = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Drive/Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
1'	S-1 0-1.0		11:45	gray brown fine SAND, very well sorted, loose, dry, non-plastic, stratified, FILL-disturbed Not enough volume for TOC jar PID=0	SP	Y	
	OC-SB-402-0.0/1.0-XXX		11:45				
4'	S-2 1.0-4.0	3.0/2.0	11:50	As above to 1.7' 1.7'-4.0' Yellow brown fine SAND, V. well sorted, loose, dry, non-plastic, stratified Alluvium NATURAL SOIL PID=0	SP		
7'	S-3 4.0-7.0'	3.0/2.5	11:57	Yellow brown to Light gray brown, fine SAND, V. well sorted, loose to med dense, dry, possibly damp @ 7', STRATIFIED ALLUVIUM PID=0	SP		
9.5'	S-4 7.0-9.5'	2.5/2.5	11:57	Yellow brown alternating w gray brown sections about 1' thick of fine SAND, damp, wet @ 8.5', very well sorted, med. dense, non-plastic, stratified. alluvium PID=0	SP	Y	
	OC-SB-402-7.5/9.5-XXX		12:00				
				B.O.B. @ 9.5' REFUSAL TO DRILL EQUIPMENT			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-403
File No.:

Contractor: Boart Longyear	Drilling Method: Rotosonic
Operator: Dave Dyschert	Bore Hole ID/OD: 4 7/8" OD; inner casing 6" OD overcasing
Logged By: Jenny Rawcliffe	Auger ID/OD: NA
Checked By: CTM	Sampler: Dave Chapeman
Date Start/Finish: 8/26/09	Hammer Wt./ Fall: NA
Boring Location: Area 6	Water Level[3]: 19.2' measured in borehole w casing
Ref. Elevation[1]:	≈ 7' Based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	3.3	1320	Concrete 0-0.4' PID=1.8			
	OC-SB-403-0/5-XXX		1325	0-3.0' Brown fine to coarse sand and gravel with traces of cobbles and silt. Slightly moist, massive (Fill). ≈1.2	SW		
				3-5' Brown to dark brown fine to medium sand with a little coarse sand and a trace of gravel. Very moist, massive. ≈1.2			
5				@5-7' ≈0.9	SP		
	Run #2 5-10	4.9	1325	5-7.5 Brown to dark brown to very dark brown, fine to medium sand with a little gravel and coarse sand at the top of the interval. PID=1.0 Very moist, slightly stratified with a couple reddish brown (iron) stained layers and some dark brown to black layers containing organic debris. ≈0.8	SP		
	OC-SB-403-6/8-XXX		1330	7.5-8 Black to very dark brown to dark brown, Peaty material with wood and other plant fragments, grading to fine to medium sand with some organic debris. Wet. ≈0.6	Pt		
10				8-9 Brown fine to medium sand. Wet ≈0.9	SP		
	Run #3 10-15	4.3	1330	10-10.5 Brown fine to medium sand. Wet. PID=1.7	SP		
				10.5-15 light brown to light olive brown fine to medium sand, wet, massive. ≈0.8			
				≈0.5			
	OC-SB-403-13/15-XXX		1340				
15				≈0.7			

Notes

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Jenny Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-403
File No.:

Contractor: Boart Longyear
Operator: Dale Dyschler
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 8/26/09
Boring Location: Area 6
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 4 7/8" OD, inner casing/6" OD outer casing
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 19.2' Measured in borehole w casing
≈7' Based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insito Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	4.6	1340	15-16 light brown to light olive brown fine to medium sand. wet. PID = 0.8			
				16-17 light olive brown fine to coarse sand and gravel with traces of silt and cobbles. Wet, massive. =0.6			
				17-18.5 light olive to light olive gray fine sand with a little medium sand, silt and a trace of gravel. Wet.			
20				18.5-20 Olive gray to gray fine to coarse sand and gravel with a little silt and cobbles. Wet, massive. No Unusual odors detected. =1.1 =0.6			
	Run #5 20-25	2.0	1345	Poor recovery 4" cobble at PID = 0.6			
				20-25 Gray to dark olive gray fine to coarse sand and gravel with some cobbles and a little silt. Wet, massive.			
25				=1.1 =0.4			
	Run #6 25-29	4.6	1355	25-27 Gray to dark olive gray fine to coarse sand and gravel with some silt and cobbles. Wet, massive. PID = 0.5 =0.4			
				27-28.5 Olive to olive brown fine to coarse sand and gravel with cobbles and silt appears to be weathered rock fragments at 28.5'. =0.4			
				28.5-29' Cobbles (Rock). =0.5			
				Top of weathered rock estimated 28.5' BGS =0.5			

Notes
Bottom of boring = 29' BGS

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Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-404
File No.:

Contractor: Boart Longyear
Operator: Dale Dyschler
Logged By: Jenny Rawcliffe
Checked By: CJM
Date Start/Finish: 9/26/09
Boring Location: Area 7
Ref. Elevation[1]:

Drilling Method: Rotosonic
Bore Hole ID/OD: 4 7/8" OD, inner casing/6" OD outer casing
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 6.1' Measured in borehole w casing

Definitions:
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U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insito Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	4.5	1515	0-1.5 Brown to dark brown fine to coarse sand and gravel with a trace of silt. (Subsample PID) PID=0.4	SW/GW		
				1.5-2.7 Brown to dark brown to slightly reddish/orange brown. Fine to medium sand with traces of coarse sand, silt. Very moist. Very dark black organic stained layer at 1.5' BGS. ≈0.5 ≈0.3	SP		
				2.7-4 Black to light grayish brown to dark reddish brown fine to medium sand with decomposed organics. Very moist. ≈0.5	PT		
5				4-5 Reddish brown fine to medium sand ≈1.0	SP		
	Run #2	4.4	1520	5-7.5 Reddish brown to light reddish brown fine to medium sand. Very moist massive, lighter colored with depth. PID=1.3 ≈2.7	SP	Yes	
	OC-SB-404-5/10-XXX		1520	7.5-10 Brown to grayish brown fine to medium sand. Wet, massive. No unusual odors. ≈1.0 ≈0.7	SP		
10				10-11.5 ≈0.4			
	Run #3 10-15	4.6	1525	Brown to grayish brown to olive brown fine to medium sand with some layers fine sand with little silt. Wet.	SP		
				11.5-14' Olive brown fine coarse sand and gravel with some cobbles and a trace of silt. W	GW		
				Moisture 14-15 Olive gray to gray fine to coarse sand and gravel with a little silt and cobbles. ≈0.4	GW/C		
	OC-SB-404-13/15-XXX		1540	Wet moisture ≈0.4			
15							

Notes

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Jenny Rawcliffe

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
Boring:	SB-404
File No.:	

Contractor:	Boart Longyear	Drilling Method:	Roto Sonic
Operator:	Dale Duselter	Bore Hole ID/OD:	4 7/8" OD inner casing / 6" OD outer casing
Logged By:	Jerry Rawcliffe	Auger ID/OD:	NA
Checked By:	CTM	Sampler:	Dave Chapman
Date Start/Finish:	8/26/09	Hammer Wt./ Fall:	NA
Boring Location:	Area 7	Water Level[3]:	6.1' measured in borehole w/o casing
Ref. Elevation[1]:			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #4 15-18	2.8	1535	15-16 Gray to dark gray fine to coarse sand and gravel with some cobbles and a trace of silt. Wet, massive. PID=0.7 / =0.6 16-17 Olive gray fine to coarse sand and gravel with some cobbles and a little silt. Wet, massive. =0.4 Hit some hard material at 17' Estimate top of rock = 17' BGS Bottom of boring = 18' BGS Recovered large cored rock fragment.			

Notes

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Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington MASS
Client: OLIN

Boring: SB-405
File No.:

Contractor: Boart Longyear	Drilling Method: Roto sonic
Operator: Dale Duscher	Bore Hole ID/OD: Inner rod OD 4 7/8 | Outer casing OD 6"
Logged By: J. Rawcliffe	Auger ID/OD: NA
Checked By: C. Mazzolini	Sampler: Dave Chapmeau
Date Start/Finish: 8/18/09	Hammer Wt./ Fall: NA
Boring Location: Area 7	Water Level[3]: ~3+ 8' Based on soil observation
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
wah = weight of 140 lb. hammer
war = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	OC-SB-405-0.0-1.0-XX		0830	0-1' Dark brown fine to coarse sand and gravel changing to brown fine to coarse sand and gravel. Moist PID = 0-0.5 ppm	SW	Y	
2		4.1/5.0		1-5' 1-2.4 Brown to yellow brown fine sand with some medium sand PID = 11.4	SP		
4				2.4-5 light brown fine sand very uniform moist. PID = 98 ppm - No obvious odors.	SP		
6		4.2/5.0		Sample #2 5-10 olive brown fine to coarse sand and gravel with a little silt. Moist, wide ranged grain sizes. Faint sweet organic odor. PID = 340 Massive (no stratification or layering apparent.) PID = 1150	SW		
8	OC-SB-405-8.0-9.0-XX		0845	Grabbed sample from this location PID = 3000 ~8-9' BGS VOC, SVOC, Metals, Anions, Ammonia		Y	
10				Breathing zone PID = 0.3 ppm			

Notes

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Jerry Rawcliffe 8/18/09

Boring: SB-405

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington MA
Client: OLIN

Boring: SB-405
File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic
Operator: Dale Dieckhaus	Bore Hole ID/OD: Inner casing OD 4 7/8" / Outer casing OD 6"
Logged By: Jerry Rawcliffe	Auger ID/OD: NA
Checked By: C. Mazzolini	Sampler: Dave Chapmeau
Date Start/Finish: 8/18/09	Hammer Wt./ Fall: NA
Boring Location: Area 7	Water Level[3]: ≈ 9' BGS
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined CompressiveStrength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
10		5.0/5.0		Run #3 10-15' med (#2) fine sand and 10-11.4 Brown fine to coarse sand with traces of gravel. wet, relatively uniformly grain size, PID=3100 ppm - appears to be possible coarse fill from area about 10' BGS	SP		
12							
14				11.4-15.0' Brown to slightly olive brown fine to coarse sand and gravel with some silt and cobbles. Very moist massive wide range of grain size. Faint sweet organic odor. 490ppm 560ppm	SW		
	OC-SB-405 1415XA		0910	1270ppm		Y	
16				Encountered something very hard at ≈15' BGS possible bedrock. 15-15.5 Drilled and recovered ≈0.5' of rock.			
18				likely bedrock but possible boulder. Bottom of boring = 15.5' BGS			
20							
22							

Notes

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Jerry Rawcliffe 8/18/09

Boring: SB-405

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-406
File No.:

Contractor: ZEBRA
Operator: Jason Fredendall
Logged By: Jerry Rawcliffe
Checked By: Chris Mazzolini
Date Start/Finish: 9/17/09
Boring Location: Area 6
Ref. Elevation[1]:

Drilling Method: Direct Push
Bore Hole ID/OD: 1.5"/3" (estimate)
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: GW at ≈ 0.5-1' BGS.

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Sleeve #1 0-5	3.9	1115	0-1.0 Very dark brown to black organics, PID=0	Pt	Yes	
	OC-SB-406-0.0/1.0-XXX		11:25	debris leaves, wood, grasses etc very decomposed and fine grained. Very moist.			
				1-3 Very dark brown organic material with =0			
				some fine sand and traces of medium sand.			
				Wet stratified, with organic layers and =0			
5				sandy organic layers.			
				3-5 Reddish brown to brown fine to medium sand	SP		
				Wet, stratified, no unusual odors =0			
	Sleeve #2 5-10	3.3	1120	5-7.5 Brown fine to medium sand. Wet PID=0.1	SP		
				stratified.			
				7.5-9.5 Olive brown fine to medium sand with =0.3	SP/SW		
				a little coarse sand and gravel. Wet, stratified.			
				9.5-10 light grey to light olive grey fine sand			
	OC-SB-406-8.0/10-XXX		1145	with ~~trace of~~ a little silt and medium to coarse sand. =0.5		Yes	
10				Wet, slight boggy/sulfer odor. =0.7	SP		
	Sleeve #3 10-15	3.5	1155	10-14.5 Grey to dark grey fine to coarse PID=0.2	GW		
			~~12:20~~	sand and gravel with traces of silt and cobbles.			
				Wet, massive =0.2	GW		
				14.5-15 Olive to light olive fine to coarse sand and			
				gravel with a little silt. Wet. =0.1	GW/GW		
	OC-SB-406-13/15-XXX		1200	Refusal at 15' BGS =0.1		Yes	
15							

Notes: Bottom of boring = 15' BGS.

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Boring: SB-406

MACTEC	Project: Olin Chemical Superfund Site Location: Wilmington, MA Client: Olin	Boring: SB-407 File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic	**Definitions:** S = Split Spoon Sample U = Thin Wall Tube Sample R = Rock Core Sample V = Insitu Vane Shear Test q_u = Unconfined Compressive Strength (psf) woh = weight of 140 lb. hammer wor = weight of rods wc = Water Content, percent oc = Organic Content, percent
Operator: Dale Dusablon	Bore Hole ID/OD: 4 7/8" OD inner casing / 6" OD outer casing	
Logged By: Jerry Rawcliffe	Auger ID/OD: NA	
Checked By: GTM	Sampler: Dave Chapman	
Date Start/Finish: 8/26/09	Hammer Wt./ Fall: NA	
Boring Location: Area 6	Water Level[3]: 21' measured in borehole w casing	
Ref. Elevation[1]:	≈ 7' Based on soils.	

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	4.4	1010	0-1.5 Dark brown fine to medium sand with traces of coarse sand and silt. (loamy topsoil) Moist, root fibers. PID = 0.7	SP	Yess	
	OC-SB-407-0/1.0-~~xxx~~		1000				
				1.5-5.0 Light brown to brown fine to medium sand with a little to trace of coarse sand and gravel. Slight layered appearance with lighter and darker colored layers. = 0.6, = 0.8, = 0.7	SP		
5	5-10						
	Run #2 ~~5-10~~	4.5	1015	5-7 Dark brown fine to medium sand with traces of coarse sand and gravel. Very moist, layer with root fibers at ≈ 5.8' Reddish (iron staining) layer at ≈ 6.2 PID = 0.9, = 0.7	SP		
				7-9' Very dark brown to black organic peaty material well decomposed grading to dark reddish brown fine-medium sand and organics some root/plant fibers. Very moist to wet.	Pt / SP		
	OC-SB-407-9/10-xxx		1020	9-10 Brown fine to medium sand with a trace of silt. Wet. No unusual odors.		Yes	
10							
	Run #3 10-15	5.0	1020	10-12 Dark brown to very dark brown fine to medium sand with some area of organic material mixed in. Wet. PID - 0.6, = 0.8			
				12-13.8 Brown to light brown fine to medium sand with a trace of silt. Wet.			
				13.8-15 light olive brown to light olive gray fine to medium sand with a trace of silt Wet. = 0.9, = 0.6			
15							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe (signature)

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-407
File No.:

Contractor: Boart Longyear
Operator: Dale Dyschler
Logged By: Jenny Rawcliffe
Checked By: CTM
Date Start/Finish: 8/26/09
Boring Location: Area 6
Ref. Elevation[1]:

Drilling Method: Rto Sonic
Bore Hole ID/OD: 4 7/8" OD, inner casing/6" OD outer casing
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 21' measured in borehole w casing
27' Based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wob = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	4.6	1030	15-15.5 Olive gray to light olive gray fine to medium sand with a trace of silt. Wet. PID=1.0	SP		
				15.5-17.5 Olive brown to olive gray fine to coarse sand and gravel with a little cobble and silt. Wet, massive, wide range of grain size. =0.8	GW/GM		
20				17.5-20' Gray to dark gray fine to coarse sand and gravel with little cobbles and silt. Wet massive, no unusual odors =0.7 =0.8			
	Run #5 20-25	4.9	1110	20-21.5 Brown to olive gray fine to medium sand with some organic debris - appears very disturbed PID=0.8 Possible cave in.			
				21.5-25 Gray to olive brown fine to coarse sand and gravel with traces of silt and cobbles wet, massive. =0.7 =0.9	GW		
25				No unusual odors. =0.6			
	Run #6 25-29	4.3	1120	25-26 Dark gray to dark olive gray fine to coarse sand and gravel with silt. Very moist to wet massive. wide range of grain size very stiff cohesion PID=0.9	GM		
	DCSB-407-26/25-X20		1125	26-27 Olive gray to reddish brown to gray fine to coarse sand and gravel with silt and traces of cobble. Very dense, moist, possible weathered bedrock. =0.5 =0.6			
				27-28 Light gray gravel and cobble and fine to coarse sand in rock flour. Likely weathered pulverized bedrock. =0.5			
				28-29' light gray gravel and cobble in rock flour.			

Notes

Estimate top of weathered rock at 27
Top of firm rock at ~28' BGS
Bottom of boring at 29' BGS

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jenny Rawcliffe

Boring: SB-407

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin

Boring: SB-407
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 4 7/8" OD inner casing/ 6" OD outer casing**
Logged By: Jerry Rawcliffe	**Auger ID/OD: NA**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/26/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 6	**Water Level: 21' measured in borehole with casing**
Ref. Elevation:	**approximately 7' based on soils**

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	4.4	1010	0-1.5' Dark brown fine to medium sand with traces of coarse sand and silt. (loamy topsoil). Moist, root fibers.	0.7	SP	YES	
	OC-SB-407-0/1.0-XXX		1010					
					0.6	SP		
				1.5-5' Light brown to brown fine to medium sand with a little to a trace of coarse sand and gravel. Slight layered appearance with lighter and darker colored layers.				
					0.8			
5					0.7			
	Run #2 5 - 10	4.5	1015	5-7' Dark brown fine to medium sand with traces of coarse sand and gravel. Very moist, layer with root fibers at ~ 5.8'. Reddish (iron stained) layer at ~ 6.2'.	0.9	SP		
					0.7			
				7-9' Very dark brown to black organic peaty material , well decomposed grading to dark reddish brown fine to medium sand and organics. Some root, plant fibers. Very moist to wet.		Pt		
					0.8			
	OC-SB-407-8/10-XXX		1020	9-10' Brown fine to medium sand with a little to a trace	0.9	SP	YES	
10								
	Run #3 10 - 15	5.0	1020	10-12' Dark brown to very dark brown fine to medium sand with some areas of organic material mixed in. Wet.	0.6			
				12-13.8' Brown to light brown fine to medium sand with a trace of silt. Wet.	0.8			
				13.8-15' Light olive brown to light olive gray fine to medium sand with a trace of silt. Wet.	0.9			
					0.6			
15								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: SB-407

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin

Boring: SB-407
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 4 7/8" OD inner casing/ 6" OD outer casing**
Logged By: Jerry Rawcliffe	**Auger ID/OD: NA**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/26/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 6	**Water Level: 21' measured in borehole with casing**
Ref. Elevation:	**approximately 7' based on soils**

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	4.6	1030	15-15.5' Olive gray to light olive gray fine to medium sand with a trace of silt. Wet.	1.0	SP		
				15.5-17.5' Olive brown to olive gray fine to coarse sand and gravel with a little cobbles and silt. Wet, massive, wide range of grain size.	0.8	GW/GM		
20				17.5-20' Gray to dark gray fine to coarse sand and gravel with a little cobbles and silt. Wet, massive, no unusual odors.	0.7 0.8			
	Run #5 20 - 25	4.4	1110	20-21.5' Brown to olive gray fine to medium sand with some organic debris - appears very disturbed possible cave in.	0.8 0.7	GW/GM		
25				21.5-25' Gray to olive brown fine to coarse sand and gravel with traces of silt and cobbles. Wet, massive, no unusual odors.	0.9 0.6			
	Run #6 25 - 29	4.3	1120	25-26' Dark gray to dark olive gray fine to coarse sand and gravel with silt. Very moist to wet, massive, wide range of grain size, very stiff, cohesive.	0.9	GM		
	OC-SB-407-26/28-XXX		1125	26-27' Olive gray to reddish brown to gray fine to coarse sand and gravel with silt and traces of cobbles. Very dense moist. Possible weathered bedrock.	0.5		YES	
				27-28' Light gray gravel and cobbles and fine to coarse sand in rock flour. Likely weathered pulverized bedrock.	0.6			
30				28-29' Light gray gravel and cobble in rock flour.	0.5			

Notes

Estimate top of weathered rock at ~27.5'
Top of firm rock ~ 28 ' bgs.
Bottom of Boring at 29' bgs.

Jerry K. Rawcliffe

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Boring: SB-407

MACTEC

Project:	Olin Chemical Superfund Site
Location:	WILMINGTON, MA
Client:	OLIN
Boring:	SB-408
File No.:	

Contractor:	ZEBRA
Operator:	E. PLANK
Logged By:	T. D. LONGLEY
Checked By:	CTM
Date Start/Finish:	BOTH 8-26-09
Boring Location:	~~BUTLER BUILDING~~ OFFICE-LAB
Ref. Elevation[1]:	
Drilling Method:	GEOPROBE/SMALL HAND PORTABLE RIG
Bore Hole ID/OD:	1.58"/2"
Auger ID/OD:	NA
Sampler:	T. D. LONGLEY
Hammer Wt./ Fall:	NA
Water Level[3]:	NA

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Drive/Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
1'	S-1 0-1.0	1.0/1.0	10:58	mostly black w/ tr. yellow brown fine SAND, well sorted, med. dense, dry, non-plastic, stratified alluvium - looks natural but likely disturbed	SP	Y	
	OC-SB-408-0.0/1.0-XXX		10:00	Sample time @ 11:00 PID=0			
4'	S-2 1.0-4.0	3.0/1.3	11:05	1'-3.6' - As Above; mostly black fine SAND, tr. yellow brown fine SAND, 3.6'-4' Abrupt change to yellow brown fine SAND, well sorted, loose, non-plastic, clean Alluvium PID=0	SP		
7'	S-3 4.0-7.0	3.0/2.6	11:11	As Above to 6.4', yellow brown fine SAND, then 6.4'-7' light grayish brown fine SAND, v. well sorted, loose to med. dense, dry, non-plastic stratified Alluvium PID=0	SP		
	7.0-9.0						
9'	S-4 ~~7.0-9.0~~ TOL	2.0/2.0	11:15	Light grayish brown fine SAND, tr. fines increase w depth, very well sorted, med. dense, wet, non-plastic, stratified, alluvium ▽=7' PID=0	SP	Y	
	OC-SB-408-7.0/9.0-XXX		11:20				
11'				B.O.B. @ 9.0' Refusal to Drill Tools			

Notes

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MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-409
File No.:

Contractor: Boart Longyear
Operator: Dave Dyschler
Logged By: Jenny Rawcliffe
Checked By: CTM
Date Start/Finish: 8/20/09
Boring Location: Area 7
Ref. Elevation[1]:

Drilling Method: Reto Sonic
Bore Hole ID/OD: 4 7/8" OD inner casing / 6" OD outer casing
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 10.4' Measured in borehole.

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insito Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5'	3.7	1645	0-0.2 Asphalt	SW		
	OC-SB-409-0/1.0-xxx		1650	0-1.0 Dark brown to brown fine to coarse sand and gravel. Moist. massive (Subgrade fill) PID=1.7 =0.9	SP	Yes	
				1.0-4.5 Dark brown to very dark brown to black fine to medium sand moist. =0.6	SP		
5				1.5-5.0 Yellowish brown to brown fine to medium sand. Very moist. sand layering with thin 10mm brown layers near bottom of interval =0.7			
	Run#2 5-10	4.9	1650	5-6.5 Yellowish brown to light olive brown fine to medium sand, wet, slightly mottled appearance in middle of interval.. PID=0.5	SP		
	OC-SB-409-6/8-xxx	DR		6.5-7.7 Dark gray to gray fine to medium sand with a trace of silt. Wet, stratified. =3.3			
				7.7-8.5 Olive brown fine to coarse sand with a trace of silt. Wet, stratified. =0.7	SP		
10	OC-SB-409-6/8-xxx		1705	8.5-10 Gray to dark olive gray fine to medium sand and gravel with a trace of coarse sand and silt. Wet. Nounusual odors detected. =0.6	SW/SP		
	Run#3 10-15	3.9	1700	10-14' Gray to olive gray fine to coarse sand and gravel with some to a little silt and traces of cobbles. Wet, massive PID=0.4 =0.5	GW/GW		
				No unusual odors detected.			
				14-15 Yellowish brown fine to coarse sand and gravel with a little silt. Moist massive =0.6 =0.4 =0.3			

Notes

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Jenny Rawcliffe

Boring: SB-409

18.5-20

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-409
File No.:

Contractor: Boart Longyear
Operator: Dave Dyszlewicz
Logged By: Jerry Rawcliffe
Checked By: JCR
Date Start/Finish: 8/16/09
Boring Location: Area 7
Ref. Elevation[1]:

Drilling Method: Rotosonic
Bore Hole ID/OD: 4 7/8" OD inner casing / 6" OD outer casing
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 6.4' Measured in Borehole

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification		Unified Classification	Analytical Collected (Y/N)	Elevation
15	Runt#4 15-20	4.1	1710	15-18.5' Yellowish brown to yellowish olive brown fine to coarse sand and gravel with some to a little silt and a little to trace of cobbles Wet, massive No unusual odors detected	PID=0.5	GW/GM	Yes	
	UC-SB-409-15/17-xxx		1715		=0.6			
				18.5' Encountering firm material cobbles or bedrock.	=0.4			
20				Estimate top of bedrock at 18.5' BGS	=0.6			
				Bottom of boring = 20' BGS.	=0.6			
				~~Wet~~ DR				

Notes

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Jerry Rawcliffe

Boring: SB-409

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin

Boring: **SB-409**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 4 7/8" OD inner casing/ 6" OD outer casing**
Logged By: Jerry Rawcliffe	**Auger ID/OD: NA**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/26/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 7	**Water Level: 6.4' measured in borehole**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	3.7	1645	0-0.2' Asphalt 0-1.0' Dark brown to brown fine to coarse sand and gravel. Moist, massive, (sub grade fill).	1.7	SW	YES	
	OC-SB-409-0/1.0-XXX		1650					
				1-1.5' Dark brown to very dark brown to black fine to medium sand. Moist.	0.9	SP		
5				1.5-5' Yellowish brown to brown fine to medium sand. Very moist, some layering with thin (10mm) brown layers near bottom of interval	0.6 0.7	SP		
	Run #2 5 - 10	4.9	1650	5-6.5' Yellowish brown to light olive brown fine to medium sand . Wet, slightly mottled appearance in middle of interval. 6.5-7.7' Dark gray to gray fine to medium sand with a trace of silt. Wet, stratified.	0.5 3.3	SP		
				7.7-8.5' Olive brown fine to coarse sand with a trace of silt. Wet, stratified.		SP		
	OC-SB-409-6/8-XXX		1705	8.5-10' Gray to dark olive gray fine to medium sand and gravel with a trace of coarse sand and silt. Wet. No unusual odors detected.	0.7		YES	
10					0.6	SW/SP		
	Run #3 10 - 15	3.9	1700	10-14' Gray to olive gray fine to coarse sand and gravel with some to a little silt and traces of cobbles. Wet, massive.	0.4	GM/GW		
				No unusual odors detected.	0.5			
				14-15' Yellowish brown fine to coarse sand and gravel with a little silt. Moist, massive	0.4			
15					0.3			

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: **SB-409**

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin

Boring: **SB-409**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 4 7/8" OD inner casing/ 6" OD outer casing**
Logged By: Jerry Rawcliffe	**Auger ID/OD: NA**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/26/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 7	**Water Level: 6.4' measured in borehole**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	4.1	1710	15-18.5' Yellowish brown to yellowish olive brown fine to coarse sand and gravel with some to a little silt and a little to traces of cobbles. Wet, massive.	0.5			
	OC-SB-409-15/17-XXX		1715				YES	
					0.6	GW/GM		
				No unusual odors detected.				
				18.5' Encountering firm material . (cobbles or bedrock).	0.4			
				Estimate top of bedrock at 18.5' bgs.	0.6			
				Bottom of boring = 20' bgs.				
20					0.6			

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-410
File No.:

Contractor: Boart Longyear
Operator: John Coralia
Logged By: Jerry Rawls/HH
Checked By: CTM
Date Start/Finish: 8/27/04
Boring Location: Area 6
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 4 7/8" OD inner casing/6" OD outer casing
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]:

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	3.3	1005	0-1.1 Brown to dark brown to medium sand with some gravel and traces of coarse sand and fragments of asphalt like fibers - Moist.	SP		
	OC-SB-410-0/10 XXX		1010				
5				1.1-3 Dark brown fine to medium sand with a trace of silt. Moist to very moist some stratification. =0.1 3-3.5 Dark brown gravel layer with fine-medium sand. Wet =0.3 3.5-5 Dark reddish brown fine-medium sand. =2.7	SP GP SP		
	Run#2 5-10	4.4	1010	5-6 Very dark brown fine sand and gravel, highly decomposed wet. Slight swampy odor	SP		
	OC-SB-410-6/8-XXX XXD XXMS/MSD		1015	6-8 Brown fine to medium sand and gravel layers at various	SP	Yes	
10				≈7' BCS. Wet. 8-10' Olive brown to olive gray to gray sand with some coarse sand gravel and cobbles and silt. Very moist No unusual odors detected	GP GP/C		
	Run#3 10-15	4.0	1015	10-11.5 Olive brown to olive gray fine to coarse sand and gravel with some cobbles. Wet, massive	GW/GP		
15				11.5-15 Olive gray to olive gray fine to coarse sand and gravel with a little silt and traces of cobbles. Wet to very moist, massive. =0.2 No unusual odors detected. =0.4	GW/GP		

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawls

Boring: SB-410

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-410
File No.:

Contractor: Boart Longyear
Operator: John Coulia
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 9/27/04
Boring Location: Area 6
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 4 7/8" OD tricone casing/6" OD overcasing
Auger ID/OD: N/A
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]:

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
wsh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Runs 15-20	3.8	1110	15-17 Olive grey to grey fine to coarse SAND and GRAVEL with a little silt and cobbles. Very moist to wet, massive	GW		
				17-19.5 Grey to dark grey to olive grey fine to coarse sand and gravel with some silt and cobbles. Very moist to wet.	GW/GM		
	OC-SB-410-17/19-XXX		1115	No unusual odors detected.		Yes	
20		XXX	XXX	Encountered hard material at 19.5 - Estimate top of bedrock.	=0.2		
				Bottom of boring = 20' BGS.			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-410
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: John Gralia	**Bore Hole ID/OD: 4 7/8" OD inner casing/ 6" OD outer casing**
Logged By: Jerry Rawcliffe	**Auger ID/OD: NA**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/27/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 6	**Water Level: 3-3.5' based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	3.3	1005	0-1.1' Brown to dark brown fine to medium sand with some gravel and traces of coarse sand and silt. (loamy topsoil). Fragments of asphalt-like 4" pipe and some root fibers. Moist.	0.1	SP	YES	
	OC-SB-410-0/1.0-XXX		1010					
					0.2			
				1.1-3' Dark brown fine to medium sand with a trace of silt. Moist to very moist, some stratification.		SP		
					0.1			
				3-3.5' Dark brown gravel layer with fine to medium sand . Wet.				
					0.3	GP		
5					2.7	SP		
	Run #2 5 - 10	4.4	1010	5-6' Very dark brown fine to medium sand and gravel. Likely decomposed organics. Wet, slight swampy ; sulfur odor.	0.1			
						SP/GP		
	OC-SB-410-6/8-XXX		1015		0.2		YES	
	-XXD			6-8' Brown fine to medium sand with traces of coarse sand and a gravel layer at ~ 7' bgs. Wet.				
	-XMS							
	-MSD			8-10' Olive brown to olive gray to olive fine to medium sand with some coarse sand and gravel and a little cobbles and silt. Very moist to wet, massive. No unusual	0.1			
						GP/GM		
					0.4			
10								
	Run #3 10 - 15	4.0	1015	10-11.5' Olive brown to olive fine to coarse sand and gravel with a little silt and traces of cobbles. Wet, massive.	0.3			
						GM/GP		
					1.1			
				11.5-15' Gray to olive gray fine to coarse sand and gravel with a little silt and traces of cobbles. Wet to very moist, massive.				
					0.2			
				No unusual odors detected.				
						GM/GP		
					0.4			
15								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: SB-410

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin

Boring: SB-410
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: John Gralia	**Bore Hole ID/OD: 4 7/8" OD inner casing/ 6" OD outer casing**
Logged By: Jerry Rawcliffe	**Auger ID/OD: NA**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/27/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 6	**Water Level: 3-3.5' based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	3.8	1110	15-17' Olive gray to dark gray fine to coarse sand and gravel with a little silt and cobbles. Very moist to wet, massive.	0.1	GW		
				17-19.5' Gray to dark gray to olive fine to coarse sand and gravel with some silt and cobbles. Very moist to wet.	0.4	GW/GM		
	OC-SB-410-17/19-XXX			No unusual odors detected.	0.2		YES	
				19.5' Encountered hard material - estimate top of bedrock.	0.2			
20				Bottom of boring = 20 ' bgs.				

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: SB-410

MACTEC

Project:	Olin Chemical Superfund Site
Location:	WILMINGTON, MA
Client:	OLIN

Boring: SB-411
File No.:

Contractor:	ZEBRA	Drilling Method:	GEOPROBE / SMALL HAND PORTABLE RIG
Operator:	E. PLANK	Bore Hole ID/OD:	1.58" / 2"
Logged By:	T.D. LONGLEY	Auger ID/OD:	NA
Checked By:	CTM	Sampler:	T.D. LONGLEY
Date Start/Finish:	BOTH 8-26-09	Hammer Wt./ Fall:	NA
Boring Location:	~~BUTLER BUILDING~~ OFFICE-LAB	Water Level[3]:	NA
Ref. Elevation[1]:			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Drive/Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
1'	S-1 0-1.0			Yellow brown fine SAND, well sorted, loose, dry, non-plastic, tr. f. gravel - FILL PID=0	SP	Y	
	OC-SB-411-0.0/1.0-XXX	1.0/1.0	10:20				
4'	S-2 1.0-4.0	3.0/2.2	10:23	Yellow brown fine SAND, well sorted, loose, dry, non-plastic; looks like fill PID=0	SP		
7'	S-3 4.0-7.0	3.0/3.0	10:26	As above, but w/ black gravel to 4.8'. 4.8-7' yellow brown to tan fine SAND, well sorted, loose to med. dense, wet @ 6.7', stratified, non-plastic, ALLUVIUM NATURAL PID=0	SP	Y	
	OC-SB-411-4.7/6.7-XXX		10:55				
		TDL	11:00				
8'	S-4 7.0-8.0	1.0/1.0	10:32	As above w/ thin 0.2' fine gravel band @ 7.3'-7.4' REFUSAL @ 8' TRACE SILT PID=0	SP		
				B.O.B. @ 8.0' REFUSAL to DRILL TOOLS			

Notes
DRILLED INSIDE BUILDING

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: OLIN

Boring: SB-412
File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic
Operator: Dale Dusch	Bore Hole ID/OD: 4"/6"
Logged By: J. Rawcliffe	Auger ID/OD: NA
Checked By: C. Marrolini	Sampler: Dave Chapman
Date Start/Finish: 8/18/09	Hammer Wt./ Fall: NA
Boring Location: Area 7	Water Level[3]: ≈ 7.0' Based on sample observations
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	3.5	1240	Top 0.2' Asphalt 0.2-0.5 Fill 0.5-1.0 Concrete PID=1.0			
	OC-SB-412-0-1.0-XXX		1245	1.0-2.0 (Surface soil sample - top 1' below concrete). Dark brown fine sand with some medium sand and traces of coarse sand and gravel. Moist, massive, uniform grain size. No apparent structure odors	SP		
				2.0-5.0 light brown to dark brown fine and with some medium sand, with traces of coarse sand. Becomes lighter colored with depth very uniform grain size. Moist, massive.	SP		
5	Run#2 5-10	5.0	1250	5-7' Brown to light brown fine to medium sand with traces of coarse sand and gravel Moist to very moist, some reddish staining (appears to be iron staining and some wood fragments/debris).	SP		
	OC-SB-412-5.0-6.0-XXX		1255				
				7-10 Brown to olive brown fine to coarse sand and gravel with some silt. Very moist, massive do range of grain sizes. No obvious odors. -0.6	SW		
10	Run#3 10-13.0	2.5	1300	10-12.5 Olive to olive gray gravel with fine to coarse sand and cobbles and some silt. Wet, massive, no apparent staining or odors. PID=0.4 =1.7	GW		
	OC-SB-412-12-13-XXX		1310	12.5-13 Similar to above but some lighter colored yellowish areas. Appear to have hit bedrock PID=0.5 at 12.5.		Y	
15				Went back down borehole and drilled to ≈13.4' BGS still in very dense hard (bedrock?) material.			

Notes

Bottom of boring 13.4' BGS Top of bedrock estimated to be 12.5' BGS

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe 8/18/09

Boring: SB-412

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-412
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 4 7/8" OD inner casing/ 6" OD outer casing**
Logged By: Jerry Rawcliffe	**Auger ID/OD: NA**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/18/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 7	**Water Level: ~7.0' based on sample observations**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	3.5	1240	0-0.2' Asphalt 0.2-0.5' Fill 0.5-1' Concrete. 1-2' (Surface soil sample top 1 foot below concrete) Dark brown fine sand with some medium sand and traces of coarse sand and gravel. Moist, massive, uniform grain size. No apparent structure or odors.	1.0	SP	YES	
			1245					
	OC-SB-412-0/1.0-XXX		1245					
5				2-5' Light brown to dark brown fine sand with some medium sand with traces of coarse sand. Becomes lighter colored with	0.9 0.7	SP		
	Run #2 5 - 10	5.0	1250					
	OC-SB-412-5/6-XXX		1255	5-7' Brown to light brown fine to medium sand with traces of coarse sand and gravel. Moist to very moist, some reddish staining (appears to be iron staining) and some wood fragments/debris (Fill)	0.9 0.7	SP	YES	
10				7-10' Brown to olive brown fine to coarse sand and gravel with some silt. Very moist, massive, wide range of grain sizes. No obvious odors.	1.1 0.8 0.6	SW		
	Run #3 10 - 13	2.5	1300	10-12.5' Olive to olive gray gravel with fine to coarse sand and cobbles and some silt. Wet, massive. No apparent staining or odors.	0.4	GW		
	OC-SB-412-12/13-XXX		1310	12.5-13' Similar to above but with some lighter colored yellowish areas. Appear to have hit bedrock at 12.5 ' bgs.	1.7		YES	
15				Went back down borehole and drilled to 13.4' bgs - still in very dense hard (bedrock?) material. Bottom of boring 13.4' bgs.	0.5			

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: SB-412

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-413
File No.:

Contractor: ZEBRA
Operator: Jason Fredericks
Logged By: Jerry Rawcliffe
Checked By: Chris Marzolino
Date Start/Finish: 9/17/09
Boring Location: Borehole
Ref. Elevation[1]:

Drilling Method: Direct Push
Bore Hole ID/OD: 1.5"/3" estimated
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: GW ≈ 2' BGS based on soils description

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Sleeve #1 0-5	2.9	1015	0-0.5 Dark brown organic debris PID=0 twigs, leaves, pine needles etc. becoming more decomposed with depth. Moist.			
	OC-SB-413-0.0/1.0-XXX		1110			Yes	
				0.5-2.5 Dark reddish brown to dark brown to brown fine to medium sand with some organic material. Very moist to wet. =0	SP		
				2.5-5' Olive brown to brown gravel and cobbles tip is brown to olive brown medium sand. Wet. =0			
5	OC-SB-413-5.0/5.0-XXX		1020			Yes	
	Sleeve #2 5-10	1.9'	1020	5-10 light olive to light olive brown PID=0 fine to medium sand with some coarse sand and gravel and a trace of cobbles. Wet No unusual odors =0	GW/GM		
10							
	Sleeve #3 10-12	1.3	1030	10-12' light olive brown fine to coarse sand and gravel with traces of cobbles and silt. Wet, massive No unusual odors =0.1 PID=0	GW/GM	Yes	
	OC-SB-413-10/12-XXX		1050				
15				Refusal with Direct Push at 12' BGS Bottom of boring = 12' BGS			

Notes

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Jerry Rawcliffe

Boring: SB-413

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-414
File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic		
Operator: Dale Duselle	Bore Hole ID/OD: 4 7/8" OD inner casing / 6" OD outer casing		
Logged By: Jerry Rawcliffe	Auger ID/OD: NA		
Checked By: CTM	Sampler: Dave Chapman		
Date Start/Finish: 8/26/09	Hammer Wt./ Fall: NA		
Boring Location: Area 6	Water Level[3]: 14.2' Measured in borehole w/casing		
Ref. Elevation[1]:	* 7' Based on soils		

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1	3.5	0835	Concrete slab 0-0.7' PID=0.2			
	OC-SB-414-0/1.0-XXX		0840	0-2 light brown fine to coarse sand and gravel with some to a little cobbles. Dry, massive (Fill). =0.6	SW/GW		
5				2-5' Brown to dark brown fine to medium sand with traces of gravel, coarse sand, and silt. Moist, massive, uniform grain size =0.3 =0.5	SP		
	Run #2 5-10	4.3	0840	5-5.5 light brown to brown fine to coarse sand and gravel. PID=1.5	SP		
	OC-SB-414-6/8-XXX		0845	5.5-8 Brown to dark brown fine to medium with a trace of coarse sand and gravel. Very moist to wet, some layering with lighter and darker colored layers 3			
10				8-10 Black to dark reddish brown fine to medium sand with traces of gravel, silt and organic debris. Organic material along black layer at 8' leaves twigs very decomposed. Wet, uniform. =0.5 =0.7	Pt SP		
	Run #3 10-15	4.1	0845	10-11.5 Brown fine to medium sand with a little to a trace of coarse sand. Wet, some layering of colors, otherwise massive. PID=0.4	SP		
				11.5-12' Gravel and cobble layer in brown fine-medium sand with a trace of coarse sand. Wet. =0.7	GP		
15				12-15 light brown to brown fine to coarse sand and gravel with a little cobbles and traces of silt. Wet, massive. =0.3 =0.6	GW		

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
Boring:	SB-414
File No.:	

Contractor:	Boart Longyear	Drilling Method:	Roto Sonic
Operator:	Dale Dusellt	Bore Hole ID/OD:	4 7/8" OD inner casing / 6" OD outer casing
Logged By:	Jerry Rawcliffe	Auger ID/OD:	NA
Checked By:	CTM	Sampler:	Dave Chapman
Date Start/Finish:	8/26/09	Hammer Wt./ Fall:	NA
Boring Location:	Area 6	Water Level[3]:	14.2' measured in borehole w casing
Ref. Elevation[1]:	27' Based on soils		

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-23	7.0	0905	15-17.5 Dark brown to brown to olive to olive grey fine to medium sand with a little coarse sand and gravel. Wet, some possible layering but disturbed by drilling. PID=0.7 =0.4 =0.5	SP		
20				17.5-22 Grey to light olive grey fine to coarse sand and gravel with a little silt and cobbles. Wet, massive =0.4	GW/GM		
	OC-SB-414-20/22 ~~xxx~~		0910	22-23 light grey cobbles and gravel rock flour. (Pulverized bedrock). Estimate top of rock to be 22' =0.6 =0.3			
	X	X	X	Bottom of boring = 23' BGS =0.3 ~~=0.3~~	(R2)		
25				~~=0.3~~	(R3)		

Notes

22 – 23

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Boring: SB-414

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-414
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 4 7/8" OD inner casing/ 6" OD outer casing**
Logged By: Jerry Rawcliffe	**Auger ID/OD: NA**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/26/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 6	**Water Level: 14.2' measured in borehole with casing**
Ref. Elevation:	**approximately 7' based on soils**

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	3.5	835	0-0.7' Concrete Slab	0.2		YES	
	OC-SB-414-0/1.0-XXX		840			SW/GW		
				0-2' Light brown fine to coarse sand and gravel with some to a little cobbles. Dry, massive. (Fill)	0.6			
					0.3			
				2-5' Brown to dark brown fine to medium sand with traces of gravel, coarse sand, and silt. Moist, massive, uniform grain size.		SP		
5					0.5			
	Run #2 5 - 10	4.3	840	5-5.5' Light brown to brown fine to coarse sand and gravel.	1.5			
				5.5-8' Brown to dark brown fine to medium sand with a trace of coarse sand and gravel. Very moist to wet. Some layering with lighter and darker colored layers.	0.3	SP		
	OC-SB-414-6/8-XXX		845					
				8-10' Black to dark reddish brown fine to medium sand with traces of gravel, silt, and organic debris. Organic material along black layer at 8' bgs - leaves, twigs, very decomposed. Wet, uniform.	0.5	Pt		
10					0.7	SP	YES	
	Run #3 10 - 15	4.1	845	10-11.5' Brown fine to medium sand with a little to a trace of coarse sand. Wet, some layering of colors, otherwise massive.	0.4	SP		
				11.5-12' Gravel and cobble layer in brown fine to medium sand with a trace of coarse sand. Wet.	0.7	GP		
					0.3			
				12-15' Light brown to brown fine to coarse sand and gravel with a little cobbles and traces of silt. Wet, massive.		GW		
15					0.6			

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin

Boring: **SB-414**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 4 7/8" OD inner casing/ 6" OD outer casing**
Logged By: Jerry Rawcliffe	**Auger ID/OD: NA**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/26/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 6	**Water Level: 14.2' measured in borehole with casing**
Ref. Elevation:	**approximately 7' based on soils**

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 23	7.0	905	15-17.5' Dark brown to brown to olive to olive gray fine to medium sand with a little coarse sand and gravel. Wet, some possible layering but disturbed by drilling.	0.7	SP		
					0.4			
				17.5-22' Gray to light olive gray fine to coarse sand and gravel with a little silt and cobbles. Wet, massive.	0.5	GW/GM		
20					0.4			
	OC-SB-414-20/22-XXX		910	22-23' Light gray cobbles and gravel in rock flour (pulverized bedrock). Estimate top of rock to be 22' bgs.	0.6		YES	
					0.3			
				Bottom of boring = 23 feet bgs.	0.3			
25								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-415
File No.:

Contractor: Boart Longyear	Drilling Method: Rotosonic
Operator: Dale Bischer	Bore Hole ID/OD: 4 7/8 inner casing OD / 6" Overcasing OD
Logged By: Jerry Rawcliffe	Auger ID/OD: N/A
Checked By: C. Mazzolini	Sampler: Dave Cibrowski
Date Start/Finish: 8/20/09	Hammer Wt./ Fall: N/A
Boring Location: Area 5	Water Level[3]: 10.5 measured in borehole, 8' Based on soils
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run# 0-5	2.6	0840	0 - 0.6 Asphalt over concrete slab. PID=0.8			
	OC-SB-415-0/10 XXX		0845	0.6-5.0 Brown to dark brown fine to medium Sand. Moist, no obvious structure, uniform grain size, no unusual odors detected. = 0.4	SP	Yes	
5				= 0.9			
	Run#2 5-10	5.2	0845	5-6.5 Brown to dark brown fine to medium sand with some wood fragments (Fill). Moist PID=33 to very moist, massive, uniform grain size. =1.2	SP	Yes	
	OC-SB-415-5/10 XXX		0850				
10		3.9 (83)		6.5-9.5 Brown fine to medium sand with traces of gravel near bottom of interval. Uniform grain size, very moist to wet, massive. =0.3	SP		
				9.5-10 Brown to olive brown fine to medium sand with little coarse sand and gravel and traces of silt. =0.2	SM		
	Run#3 10-15	~~5.3~~	0855	10-11.5 Brown to olive Brown fine to coarse sand PID with 0.3 some coarse sand and gravel and a little silt. Very moist to wet, massive, no evidence of grain size =0.2	SM/GM		
				11.5-15' Brown to olive to olive gray to dark olive gray fine to coarse sand and gravel with some cobbles and a little silt. Very moist, generally massive but with layers of 0.5' thick of varing colors noted above. No unusual odors or staining observed. PID = 1.2 =0.2	SM/GM		
15							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Boring: SB-415

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin.

Boring: SB-415
File No.:

Contractor: Boart Longyear	Drilling Method: RotoSonic		
Operator: Dale Duschl	Bore Hole ID/OD: 4"/6"		
Logged By: Jerry Rauwcliffe	Auger ID/OD: NA		
Checked By: C. Marzolini	Sampler: Dave Chapman		
Date Start/Finish: 8/20/09	Hammer Wt./ Fall: NA		
Boring Location: Area 5	Water Level[3]: 10.5 measured in boring 8' based on soils.		
Ref. Elevation[1]:			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #4 15-19	4.2	0905	15-16.5 Olive to dark brown fine to coarse sand and gravel with some silt and cobbles. Wet, massive, some apparent iron staining around a cobble. PID = 0.6 =1.1 16.5-18 Dark olive brown fine to coarse sand and gravel with some silt and trace cobbles.	SM/GM		
	OC-SB-415-16/18-XXX		0910	Moist massive. 18-18.5 Olive brown similar to above but, slightly moist and less silt. =0.6 PID=2.2		Yes	
20				Encountered possible bedrock at 18.5' Drilled thru rock 18.5-19'			
				Bottom of boring = 19' BGS.			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rauwcliffe

Page 2 of 2

Boring: SB-415

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin

Boring: **SB-415**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 4 7/8" OD inner casing/ 6" OD outer casing**
Logged By: Jerry Rawcliffe	**Auger ID/OD: NA**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/20/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 5	**Water Level: 10.5' measured in borehole, 8' based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	2.6	840	0-0.6' Asphalt over concrete slab	0.8		YES	
	OC-SB-415-0/1.0-XXX		845			SP		
				0.6-5' Brown to dark brown fine to medium sand. Moist, no obvious structure, uniform grain size. No unusual odors detected.	0.4			
5					0.9			
	Run #2 5 - 10	5.2	845	5-6.5' Brown to dark brown fine to medium sand with some wood fragments (Fill). Moist to very moist, massive, uniform grain size.	33	SP	YES	
	OC-SB-415-5/7-XXX		850		1.2			
				6.5-9.5' Brown fine to medium sand with traces of gravel near bottom of interval. Uniform grain size, very moist to wet, massive.	0.3	SP		
10				9.5-10' Brown to olive brown fine to medium sand with a little coarse sand and gravel and traces of silt.	0.2	SM		
	Run #3 10 - 15	3.9	855	10-11.5' Brown to olive brown fine to medium sand with some coarse sand and gravel and a little silt. Very moist to wet, massive, wide range of grain size.	10.3	SM/GM		
				11.5-15' Brown to olive to olive gray to dark olive gray fine to coarse sand and gravel with some cobbles and a little silt. Very moist, generally massive but with layers 0.5 ' thick of varying colors as noted above.	0.2			
					0.2	SM/GM		
15				No unusual odors or staining observed.	1.2			

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: **SB-415**

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-415
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 4 7/8" OD inner casing/ 6" OD outer casing**
Logged By: Jerry Rawcliffe	**Auger ID/OD: NA**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/20/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 5	**Water Level: 10.5' measured in borehole, 8' based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 19	4.2	905	15-16.5' Olive to olive brown fine to coarse sand and gravel with some silt and cobbles. Wet, massive, some apparent iron staining around a cobble.	0.8	SM/GM		
				16.5-18' Dark olive brown fine to coarse sand and gravel with some silt and trace cobbles. Moist, massive.	1.1			
	OC-SB-415-16/18-XXX		910		0.6		YES	
				18-18.5' Olive brown similar to above but slightly moist and less silt.				
				Encountered possible bedrock at 18.5' bgs.				
				Drilled through rock 18.5 - 19' bgs.	2.2			
20				Bottom of boring = 193 feet bgs.				
25								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: SB-415

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington NC
Client: OLIN

Boring: SB-416
File No.:

Contractor: Boart Longyear	Drilling Method: Rotosonic
Operator: Dale Dusch	Bore Hole ID/OD: Innercasing 4"/8" / Outercasing OD 6"
Logged By: J. Rawcliffe	Auger ID/OD: NA
Checked By: C. Mazzilli	Sampler: Dave Chapman
Date Start/Finish: 8/18/09	Hammer Wt./ Fall: NA
Boring Location: Area 8	Water Level[3]: ≈7.5' BGS
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	4.6	1030	0-0.4 Concrete light gray brown pulverized concrete			
	OC-416-0.0-1.0-XXX		1035	0.4-1.4 Brown fine to medium sand with some coarse sand and gravel. Dry to moist. No obvious odors. PID = 3.9	SP/SW		
				1.4-5.0 Brown to light brown fine sand with some medium sand and traces of coarse sand and gravel. Moist, no apparent structure. Fairly uniform grain size. = 10 = 25 = 38 = 52	SP		
5							
	Run#2 5-10	5.3'	1040	5-6.2 Brown fine to medium sand. Similar to 1.4-5.0'. PID = 63 ppm	SP		
				6.2-10.0 Olive to olive gray fine to coarse sand and gravel with some to a little cobbles and silt. Massive moist to very moist. ~91 ppm	SW/GW		
				Water heard borehole BG			
	OC-416-8.0-9.0-XXX		1045	Slight Breathing ppm	ppm		
10					0 ppm		
	Run#3 10-14.5	4.5	1050	10-14.5 Olive gray to dark ve to coarse sand and silt w some and cobbles. Moist, mo though areas appear to have more Faint sweet organic odor.	GM		
					pp		
	13-14'				p		
	OC-416-13-14.5-XXX		1105	Encountered possible bedrock BG recovered rock fragments sim in SB-405.	81 ppm		
15							

Notes

Bottom of boring = 14.

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe 8/18/09

Boring: SB-416

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-417
File No.:

Contractor: Boart longyear
Operator: Greg Hyllidy
Logged By: Jerry Rawcliffe
Checked By: ctm
Date Start/Finish: 9/10/04
Boring Location: Area 8
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ≈9-10' BGS based on soil observations

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	2.7	1035	0-0.5 Brown fine to medium sand with some coarse sand and gravel. Dry, some grass and roots fibers. (Sandy topsoil loam) PID = 0.1	SW		
	OC-SB-417-0/1.0-XX		1040	0.5-5' light brown to brown fine to medium sand with a little coarse sand and gravel traces of silt. Dry to moist. PID = 0.1	SW/SP	Yes	
5				PID = 0.2			
				PID = 0.3			
	Run#2 5-10	4.3	1040	5-10 light brown medium PID 2.3 little fine sand and traces ≈17 Moist, some slight stratification size generally very uniform. N,	SP		
10	OC-SB-417-8/10-XX		1050		SP	Yes	
	Run#3 10-15	3.7	1110	10-11 Brown to light brown medium sand PI with some coarse sand and fine sand. Wet.	SP		
				11-12.5 light brown to brown fine sand with a little silt and traces of medium to coarse sand along layers	SP/SW		
				Dark reddish brown layer (5mm) at ≈11.1'			
				Coarse grained light reddish brown layers at ≈11.5' Reddish brown stained layer at ≈12' BGS	SP/SW		
15				12.5-13 Brown medium to coarse sand with little gravel and fine sand. Wet.			
				13-13.5 Olive grey medium to coarse sand and gravel with a trace of silt and cobbles.	SW		
				13.5-15 Brown medium to coarse sand and gravel with a little fine sand and cobbles.			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-417
File No.:

Contractor: Boart longyear
Operator: Greg Hallucky
Logged By: Terry Rawcliffe
Checked By: ctm
Date Start/Finish: 9/10/09
Boring Location: Area 8
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 9-10' BGS based on soil observations

Definitions:
S = Split Spoon Sample
U = Thin Well Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run# 4 15-20	3.8	1135	15-18 Brown medium to coarse sand with some thin gray colored layers, Wet. PID = 0.5 = 1.8	SP		
				18-20 Dark olive gray to very dark gray fine to medium sand and gravel with some silt and a little coarse sand and cobbles. Black colored layer at ≈ 24.5' BGS. Possible slight sewer-like odor. = 1.4 = 0.6	GW/GM		
20	Run# 5 20-22.5	2.9	1200	20-21 Dark gray fine to coarse sand with some silt, gravel and traces of cobbles. Wet, massive PID = 0.3			
	DC-SB-417-20/22-XXA		1205	21-22.5 Dark gray to gray fine to coarse sand and gravel with silt. Bottom (21.5-22.5) looks like pulverized rock. = 0.2 = 0.3	GW	Yes	
25				Estimate top of bedrock = 21' BGS			
				Bottom of boring = 22.5' BGS			

Notes

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Terry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-418
File No.:

Contractor: Boart Longyear
Operator: John Coraffa
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 8/27/09
Boring Location: Area 5
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 4 7/8" OD, inner casing/6" OD outer casing
Auger ID/OD: N/A
Sampler: Dave Chapman
Hammer Wt./ Fall: N/A
Water Level[3]: Measured at 5.3' BGS in cased borehole

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wob = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	3.6	0815	0-0.2' Asphalt PID=0.2			
	OC-SB-418-0/1.0-XXX		0825	0-1.2 Brown to dark brown fine to coarse sand and gravel with a trace of silt/cobbles (Subgrade Fill) Moist, massive. =0.1	SW		
5				1.2-5 light brown to grayish brown to brown fine to medium sand with gravel, some cobbles coarse sand and a trace of silt. =0.1 =0 No odors (observed) detected. =4.6	SW/G		
	Run#2 5-10	4.2	0825	fine medium and coarse and traces of fine medium sand with a little	SW/G		
10	OC-SB-418-8/10-XXX		0835	and traces of and wet No unusual odor	GW/GW	yes	
	Run#3 10-15	4.5	0835	10-11 Brown fine to coarse and with a little silt, and wet 11-12.5 Olive brown fine to gravel with some silt. Very	SW/GW		
15				12.5-15 Brown to olive brown sand and gravel with moist, massive. reddish at ≈9.5'. No unusual odor transition layer	GW/GW		

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Boring: SB-418

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA.
Client:	Olin

Boring: SB-418
File No.:

Contractor:	Boart Longyear	Drilling Method:	RotoSonic
Operator:	John Cratia	Bore Hole ID/OD:	4 7/8" OD inner casing / 6" OD outer casing
Logged By:	Jerry Rawel	Auger ID/OD:	NA
Checked By:	GM	Sampler:	Dave Chapman
Date Start/Finish:	8/27/09	Hammer Wt./ Fall:	NA
Boring Location:	Area 5	Water Level[3]:	Measured at 5.3' BGS in cased borehole
Ref. Elevation[1]:			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-18	2.1	0850	15-17 Brown to olive brown to dark olive gray fine to coarse sand and gravel with traces silt and cobbles. Wet, massive. Encountered hard material - e top bedrock at 17' BGS	GW	Yes / GM	
	OC-SB-418-15/17-xxx		0900				
	X	X	X	Bottom of boring = 18' BGS			
20							

Notes

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Jerry Rawel

Page 2 of 2

Boring: SB-418

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-419
File No.:

Contractor: Boart Longyear	Drilling Method: Rotosonic
Operator: Dale Dustbier	Bore Hole ID/OD: Inner 4 7/8 OD / Outer 6" OD
Logged By: Jeny Rawcliffe	Auger ID/OD: NA
Checked By: C. Marzolin	Sampler: Dave Chapman
Date Start/Finish: 8/19/09	Hammer Wt./ Fall: NA
Boring Location: Area 5	Water Level[3]: 8.5 measured in borehole.
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	3.4	1550	0-0.2 Asphalt PID = 0.4 ppm			
	OC-SB-426-0/10	XXX	1555	0.2-0.6 Concrete =1.3 ppm		Yes	
				0.6-5.0 Brown to light brown fine to medium sand. Moist, no apparent structure, some gravel=3.2	SP		
				and concrete fragments near top of sample. No unusual odors. =2.8 ppm			
	OC-SB-426-3/5	XXX	1605	=3.7 ppm		Y	
5							
	Run #2 5-10	4.4	1610	5-6 Brown to dark brown fine to medium PID=4.3	SP		
				sand. Moist massive, uniform grain size.			
				6-7 Brown to light brown fine to medium sand =4.7	SP		
				with a trace of gravel and coarse sand. Moist to very moist has a slight mottled appearance.			
				Uniform grain size Olive brown fine to =3.8			
				7-8.5 Brown to light ~~brown~~ medium sand. Wet, no unusual odors. =0.3	SP		
				8.5-10 Olive brown to yellowish brown fine =6.4			
10				to coarse sand and gravel with a little silt. =2.3 ppm			
	Run #3 10-15	5.1	1620	Very moist, mottled. PID = 1.2 ppm			
				10-12 Brown fine to coarse sand with some gravel and traces of silt, More gravel =0.7	GW/GM		
				with depth.			
				12-14 Brown to olive brown fine to coarse sand			
				and silt with gravel. Moist, massive. =0.1			
				14-15 Brown fine to coarse sand and gravel =0.2	GW/GM		
15				with a little silt. Massive, moist, no unusual odors. =0.1			

Notes
A5-P3

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jeny Rawcliffe

Boring: SB-419

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-419
File No.:

Contractor: Boart long years
Operator: Dale Duschek
Logged By: Jerry Rawcliffe
Checked By: C. Morrison
Date Start/Finish: 8/19/09
Boring Location: Area 5
Ref. Elevation[1]:

Drilling Method: Rotosonic
Bore Hole ID/OD: 4½ inner casing OD/6" outer casing OD
Auger ID/OD: NA
Sampler:
Hammer Wt./ Fall: NA
Water Level[3]: 8.5' measured in borehole

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #14 15-21	4.3	1630	15-16.8 Olive to olive gray fine to coarse sand PID- 0.2 and gravel with some cobbles and silt. Wet, massive.	GW/GW		
				16.8-19 light yellowish brown fine to coarse sand and gravel with some cobbles and silt. =0.3			
				Wet, massive.			
	OC-SB-419-17/19-XXS		1640	16.8-19 light yellowish brown fine to coarse sand and ~~silt~~ gravel with a little silt and cobbles. =0.2	CW	Yes	
20				Very moist to wet =0.1			
				19-21 Gray to light gray cobbles, gravel and what appears to be pulverized rock (rock flour). Estimate top of rock to be 20-20.5' BGS			
				Bottom of boring = 21.0' BGS.			
25							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Boring: SB-419

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin
6107090016 - 09

Boring: SB-420
File No.:

Contractor: Boart Longyear
Operator: Dale Dusher
Logged By: Jerry Rauckliff
Checked By: C. Morrolini
Date Start/Finish: 8/18/09
Boring Location: Area 8
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: Inner casing 4 7/8 Outer Casing 6" (OD)
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 7.4-BGS

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined CompressiveStrength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
				Concrete slab 0-0.7'BGS ID=60 =13.4 } top	1.0'		
	Run#1 0.7-5.0	3.9	1550	0.7-1.8 light brown to gray fy silt looks like pulverized concrete (rebar) =40			
	OC-SB-420 0-1	xxx	1555				
				1.8-3.2 Brown fine to medium sand, uniform grain size moist, no apparent structure or odors. =28	SP		
				3.2-5.0 Brown to gray fine to coarse sand and gravel with some small cobbles bottom of recovery appears to be pulverized concrete. Moist to dry. =32	SW/GW		
5							
	Run#2 5-10	4.9	1605	5-5.8 Dark brown to dark olive brown fine to coarse sand with some gravel. PID = 180			
				5.8-7.0 Olive to olive brown fine to coarse sand and silt with some gravel and cobbles very moist, sweet organic odor. PID = 2700	SM/GM		
	OC-SB-420-6.5-8.5	xxx	1610				
				7.0-8 Similar to above but less cohesive (less fines), moist PID = 2700			
				8-8.6 Gray to olive gray fine to coarse sand and silt with gravel and traces of cobbles.	GM		
10				8.6-10 Dark gray to dark olive gray fine to coarse sand and silt. Very moist PID = 210			
	Run#3 10-14	3.9	1615	10-14 Dark olive gray to very dark gray fine to medium sand and silt matrix with coarse sand gravel and some cobbles, Very moist to wet massive, (Till-like appearance). 0. 0.	GM		
	OC-SB-420-12-14	xxx	1625	Encountered something hard at 13' drilled to 14'BGS through probably bedrock 0.4		Y	
15				Bottom of boring = 14.0'BGS			

Notes

Top sample collected at top 1' of recovery below slab ≈ 0.7-1.7'BGS

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rauckliff

Page 1 of 1

Boring: SB-420

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-420**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 4 7/8" OD inner casing/ 6" OD outer casing**
Logged By: Jerry Rawcliffe	**Auger ID/OD: NA**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/18/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 8	**Water Level: ~7.4' bgs**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
				0-0.7' Concrete slab.				
	Run #1 0 - 5	4	1550	0.7-1.8' Light brown to gray fine sand and silt. Looks like pulverized concrete (piece of rebar).	60			
	OC-SB-420-0/1.0-XXX		1555				YES	
				1.8-3.2' Brown fine to medium sand. Uniform grain size, moist, no apparent structure or odors.	40	SP		
				3.2-5' Brown to gray fine to coarse sand and gravel with some small cobbles. Bottom of recovery appears to be pulverized concrete. Moist to dry.	28			
5					32	SW/GW		
	Run #2 5 - 10	4.9	1605	5-5.8' Dark brown to dark olive brown fine to coarse sand with some gravel.	180			
						SM/GM		
				5.8-7' Olive to olive brown fine to coarse sand and silt with some gravel and cobbles. Very moist, sweet organic odor.	2700			
	OC-SB-420-6.5/8.5-XXX		1610				YES	
				7-8' Similar to above but less cohesive (less fines). Moist.	2700	GM		
				8-10' Dark gray to dark olive gray fine to coarse sand and silt. Very moist.	2100			
10								
	Run #3 10 - 14	3.9	1615	10-14' Dark olive gray to very dark fine to medium sand and silt matrix with coarse sand gravel and some cobbles. Very moist to wet, massive (Till-like appearance).	6.1			
						GM		
					0.3			
				Encountered something hard at 13' bgs. Drilled to 14' bgs through probable bedrock.				
	OC-SB-420-12/14-XXX		1625		2.2		YES	
				Bottom of boring 14' bgs.				
					0.4			
15								

Notes

Top sample collected at top 1 foot of recovery below slab approximately 0.7 to 1.7 feet bgs.

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site Location: Olin-Wilmington Ma. Client: Olin 6107090016-09		Boring: SB-421 File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic	**Definitions:**
Operator: Dale Dueller	Bore Hole ID/OD: inner casing 4"/VID/Outer casing 6" OD	S = Split Spoon Sample
Logged By: Jerry Rawcliffe	Auger ID/OD: NA	U = Thin Wall Tube Sample
Checked By: C. Mazzolini	Sampler: Dave Chapman	R = Rock Core Sample
Date Start/Finish: 8/19/09	Hammer Wt./ Fall: NA	V = Insitu Vane Shear Test
Boring Location: Area 8	Water Level[3]: 10-10.5' (WL meter) BGS	q_u = Unconfined Compressive Strength (psf)
Ref. Elevation[1]:		woh = weight of 140 lb. hammer
		wor = weight of rods
		wc = Water Content, percent
		oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	4.6	0735	0-1 Brown to dark brown fine to coarse sand and gravel. Dry to moist, massive. PID=10.6	SW/GW	Y	
	OC-SB-421-0-1.0-XXX		0740	1-1.5 Dark brown to dark grayish brown to dark reddish brown fine to coarse sand and gravel. Moist. Some weak layering. wide range of grain size =3.8	SW		
				1.5-2.7 Dark brown fine to medium sand moist, no apparent structure, no unusual odors. =4.0			
5				2.7-5.0 Brown to light brown fine to medium sand moist, massive, uniform grain size. No distinct unusual odors. =7.4 =85	SP		
	Run#2 5-10	4.4	0745	5-9 Brown to light brown fine to medium sand moist, some stratification (difficult to see after vibration from rotosonic). Uniform grain size. =2.1 =23	SP		
10	OC-SB-421-8.0-10-XXX		~~0755~~ 0745	9-10 Olive to olive gray fine to coarse sand and gravel with a little silt. Massive, wide range of grain size. PID =33 PID =76	SW/GW	Y	
	Run#3 10-13	2.9	0800	10-10.8 Brown gravel with some fine to coarse sand. PID=140			
	OC-SB-421-10.5-12.5-XXX		0805	10.8-11.5 Olive to olive brown fine to coarse sand and gravel with a little silt cobbles. Very moist, mottled appearance PID = 270 11.5-12.5 Dark gray fine to coarse sand and gravel with a little silt. Slight sweet organic odor. PID = 1050	GW	Y	
15				Encountered possible top of bedrock at 12.5. Drilled to 13.0' BGS - large pieces of rock in shoe rock similar composition to what appears to be bedrock refusal in other boreholes.			

Notes

PID = Background in breathing zone

~~Some~~

Bottom of boring = 13.0' BGS

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Boring: SB-421

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-421**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 4 7/8" OD inner casing/ 6" OD outer casing**
Logged By: Jerry Rawcliffe	**Auger ID/OD: NA**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/19/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 8	**Water Level: 10 - 10.5' bgs (WL meter)**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	4.6	735	0-1' Brown to dark brown fine to coarse sand and gravel. Dry to moist, massive.	10.6		YES	
	OC-SB-421-0/1.0-XXX		740	1-1.5' Dark brown to dark grayish brown to dark reddish brown fine to coarse sand and gravel. Moist, some crude layering, wide range of grain size.		SW/GW		
				1.5-2.7 ' Dark brown fine to medium sand. Moist, no apparent structure, no unusual odors.	3.8	SW		
					4.0			
				2.7-5' Brown to light brown fine to medium sand . Moist to dry.. Moist, massive uniform grain size. No distinct unusual	7.4			
5					8.5	SP		
	Run #2 5 - 10	4.4	745	5-9' Brown to light brown fine to medium sand. Moist, some stratification (difficult to see after vibration from rotosonic). Uniform grain size.	2.1			
					23	SP		
					33	SW/GW		
	OC-SB-421-9/10-XXX		745	9-10' Olive to olive gray fine to coarse sand and gravel with a little silt. Massive, wide range of grain size.			YES	
10					76			
	Run #3 10 - 13	2.9	800	10-10.8' Brown gravel with some fine to coarse sand.	140			
				10.8-11.5' Olive to olive brown fine to coarse sand and gravel with a little silt, cobbles. Very moist, mottled appearance.	270	GW		
	OC-SB-421-10.5/12.5-XXX		805	11.5-12.5' Dark gray fine to coarse and gravel with a little silt. Slight sweet organic odor.`			YES	
				Encountered possible top of bedrock at 12.5' bgs.	1050			
				Drilled to 13' bgs - large pieces of rock in shoe, rock similar in composition to what appears to be bedrock refusal in other boreholes.				
15				Bottom of boring = 13' bgs.				

Notes

PID = Background in breathing zone.

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-422
File No.:

Contractor: Boart Longyear
Operator: Dale Dyschler
Logged By: Jerry Rawcliffe
Checked By: CTH
Date Start/Finish: 8/25/09
Boring Location: Area 6
Ref. Elevation[1]:

Drilling Method: Rito Sonic
Bore Hole ID/OD: 4 7/8" OD, inner casing/6" OD overcasing
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 7-8 Based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wsh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 1635	1.5	1635	0-0.5' Concrete Brown to olive brown fine to coarse sand and gravel. Moist, massive (Fill) PID=0			
	OC-SB-422-0/1.5 XXX		1635	Very little recovery as 4½-5" cobble plugged end of sample casing =0			
5							
	Run #2 5-10	5.0	1640	5-6 Reddish dark brown fine to medium sand with slight reddish (iron?) staining - Moist - PID=0	SP		
	OC-SB-422-6/8-XXX		1645	6-6.5 Brown fine to medium sand. Very moist 6.5-7.2 Dark brown to very dark brown fine to medium sand with traces of gravel and organic/wood =0			
10				fragments. Very moist to wet. 7.2-9' Very dark brown to black organic sand fine sand. well decomposed with some root fibers =0 wood fragments etc. (Peaty material). Slight sulfer odor 9-10 Dark brown fine sand and organic =0	SP Peat		
	Run #3 10-15	4.8	1645	material (peaty). 10-11.2 Similar to 9-10' sample PID=0 11.2-11.8 Dark brown to dark olive brown fine to medium sand with some coarse sand gravel and cobbles. =0 Wet.	SP GW		
				11.8-15 Olive to olive brown to olive gray fine to coarse sand with some gravel and some to a little silt and cobbles. Wet, massive =0	GW/GM		
15	OC-SB-422-13/15-XXX		1710				

Notes

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Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB 422
File No.:

Contractor: Boart Longyear
Operator: Dale Dyscher
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 8/25/09
Boring Location: Area 6
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 4 7/8" OD, inner casing/6" OD outer casing
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[2]: 7-8' BGS Based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wsh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	4.4	1655	15-17 Dark brown fine to coarse sand and gravel with some to a little cobbles. PID = 0 Wet, (Possible cave in material 17-20 Olive gray to dark gray fine to coarse sand = 0 and gravel with some silt and cobbles Wet, massive, wide range of grain sizes	GW/GM GM		
20	Run #5 20-23	2.6	1710	20-22 Olive gray to dark gray to slightly greenish gray fine to coarse sand and gravel with PID = 0 cobbles and a little silt Wet, massive. = 3.3 Encountered hard material at 22' BGS = 0 Estimated top of bedrock. Bottom of boring = 23' BGS.	GW/GM		
25							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Boring: SB-422

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington MA
Client: OLIN

Boring: SB-423
File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic
Operator: Dale Dussdner	Bore Hole ID/OD: 4 7/8 / 6" Inner/Outer casing OD
Logged By: Jerry Rawcliffe	Auger ID/OD: NA
Checked By: C. Mazzeo	Sampler: Dave Chapmen
Date Start/Finish: 8/18/09	Hammer Wt./ Fall: NA
Boring Location: Area 8	Water Level[3]: est 8' BGS (based on soil observations)
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	4.4'	1415	0-0.2 Asphalt.			
	OC-SB-423-0-1.0-XXX		1420	0-1.0 0.0.7 Dark brown fine to coarse sand with some gravel. 0.7-1 Brown to light brown f sand. medium	SW		
				0.7-2.5 Brown fine to medium sand with traces			
				of coarse sand. Moist, massive, no obvious odors. uniform grain size PID=76	SP		
				2.5-5 Very light brown to light gray fine to medium sand with some coarse sand and gravel. Moist to dry, no obvious structure or odors. PID=260			
5							
	Run#2 5-10		1425	5-6.5 Dark brown to dark gray fine to PID=18.4	GW	Y	
	OC-SB-423-5-6-XXX	4.8	1430	coarse sand and gravel with cobbles and a little silt. Moist.			
				6.5-8 Brown fine to coarse sand and gravel with some cobbles and a little silt. Moist PID=4.0			
				8-8.5 Gray fine to coarse sand and gravel with some cobbles. Moist PID=10.2	GW		
				8.5-10 Brown to dark brown fine to coarse PID=3.8 sand and gravel with some silt. Moist PID=8.4			
10				to very moist.			
	Run#3 10-15'	4.7	1435	10-11.8 Olive gray to gray fine sand and silt PID=2.4 matrix with gravel cobbles, and medium to coarse	GM/GW		
				sand. Very moist. PID=0.8			
				11.8-13 Olive to olive brown fine to coarse sand and silt with some gravel and traces cobbles. moist.			
				13-13.8 Gray to dark gray fine sand and silt PID=0.4 with medium to coarse sand and gravel moist,	GM		
	OC-SB-423-13-14-XXX		1445	massive (Till like)		Y	
				13.8-15 Gray cobbles and gravel and a fine sandy PID=0.4 silty powder that appears to be pulverized rock. (Crushed Hard			
15							

Notes

some cobbles are quartzite. Estimate top of bedrock is ≈ 14' BGS.

Bottom of boring = 15.2' BGS

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe 8/18/09

Boring: SB-423

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-423**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 4 7/8" OD inner casing/ 6" OD outer casing**
Logged By: Jerry Rawcliffe	**Auger ID/OD: NA**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/18/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 8	**Water Level: estimate 8' bgs (based on soil observations)**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	4.4	1415	0-0.2' Asphalt 0-0.7' Dark brown fine to coarse sand with some gravel. 0.7-1' Brown to light brown fine to medium sand.	15.8	SW	YES	
	OC-SB-423-0/1.0-XXX		1420	1-2.5 ' Brown fine to medium sand with traces of coarse sand. Moist, massive, no obvious odors, uniform grain size.	62			
5				2.5-5' Very light brown to light gray fine to medium sand with some coarse sand and gravel. Moist to dry, no obvious structure or odors.	76 280	SP		
	Run #2 5 - 10	4.8	1425	5-6.5' Dark brown to dark gray fine to coarse sand and gravel with cobbles and a little silt. Moist.	184	GW	YES	
	OC-SB-423-5/6-XXX		1430	6.6-8' Brown fine to coarse sand and gravel with some cobbles and a little silt. Moist.	4			
10				8-8.5' Gray fine to coarse sand and gravel with some cobbles. Moist.	10.2	GW		
				8.5-10' Brown to dark brown fine to coarse sand and gravel with some silt. Moist to very moist.	3.8 8.4			
	Run #3 10 - 15	4.7	1435	10-11.8' Olive gray to gray fine sand and silt matrix with gravel, cobbles, and medium to coarse sand. Very moist.	2.4			
				11.8-13' Olive to olive gray fine to coarse sand and silt with some gravel and traces of cobbles. Moist.		GM/GW		
				13-13.8' Gray to dark gray fine sand and silt with medium to coarse sand and gravel. Moist, massive (Till-like).	0.8			
				13.8-15' Gray cobbles and gravel and a fine sandy silty powder that appears to be pulverized rock (rock flour). Some cobbles are quite large.	0.4			
	OC-SB-423-13/14-XXX		1445			GM	YES	
					0.9			
15				Estimate top of bedrock is ~ 14' bgs. Bottom of boring = 15.2' bgs.				

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: **SB-423**

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin.

Boring: SB-424
File No.:

Contractor: Boart Longyear
Operator: Dale Dyschof
Logged By: Jenny Rawcliffe
Checked By: C. Mangalini
Date Start/Finish: 8/19/09
Boring Location: Area 8
Ref. Elevation[1]:

Drilling Method: Rotosonic
Bore Hole ID/OD: Inner casing OD 4 7/8" / outer casing OD 6"
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 8.5'

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	3.6	1130	0-5 Brown to light brown fine to medium sand, moist, massive, becomes slightly darker colored with depth. No unusual odors. PID= 1.7 ppm =0.8 PID = 1.4	SP	Y	
	OC-SB-424-0-1.0-XX		1135				
5				PID = 0.6 Encountered apparent boulder at 5' BGS PID= 1.2 Going to move rig ≈ 10' southeast.			
	Run#2 5-9	4.3	1205	5-7' Brown to dark brown fine to coarse sand and gravel. Moist, massive, wide range of grain size. PID=13 =8.0 7-9 Olive brown to olive fine to coarse sand and gravel with some silt and small cobbles.	SW/GW		
				Moist, massive, silt/clay cohesive layer (7.5-8'). =37 No unusual odors or staining. Encountered what appears to be concrete at 9' BGS. =12			
	OC-SB-424-7.0-9.0-XX		1215			Yes	
	Run#3 9-15	5.3	1220				
10				PID= 31 ppm			
				9-11 Light grey to olive grey fine to coarse sand and gravel, traces of cobbles and silt. Some layers with dry and very moist layers. =6 ppm	GW/GM		
				11-15 Dark olive grey fine to coarse sand and gravel with some silt and cobbles. Very moist with some silt/clay cohesive areas/layers. =98 ppm =117 ppm	GW/GM		
15				=124 ppm			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jenny Rawcliffe

Boring: SB-424

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-424
File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic
Operator: Dale Drescher	Bore Hole ID/OD: Inner casing UO4"/5/Outer casing OD 6"
Logged By: Terry Rawcliffe	Auger ID/OD: NA
Checked By: C. Mazzolini	Sampler: Dave Chrysanna
Date Start/Finish: 8/19/04	Hammer Wt./ Fall: NA
Boring Location: Area 8	Water Level[3]: 8.5' BGS
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wwh = weight of 140 lb. hammer
wwr = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #4 15-19	4.6	1230	15-17.5 Dark olive gray fine to coarse sand and gravel with some silt and cobbles. Very moist, massive, wide range of grain size. PID = 4.9 = 6.2	GW/GM		
				17.5-19' Olive gray to light olive brown fine to coarse sand and gravel with cobbles and some silt. Wet, massive bottom of sample has a mottled appearance. = 8.4 = 2.4			
	IX-SB-424-17-19XX		1235			Yes	
20				Encountered what appears to be bedrock at 19' BGS Did not get any recovery of rock.			
				Bottom of boring = 19.2' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Terry Rawcliffe

Boring: SB-424

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-424**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 4 7/8" OD inner casing/ 6" OD outer casing**
Logged By: Jerry Rawcliffe	**Auger ID/OD: NA**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/19/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 8	**Water Level: 8.5'**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	3.6	1130		1.7			
	OC-SB-424-0/1.0-XXX		1135				YES	
				0-5' Brown to light brown fine to medium sand . Moist, massive, becomes slightly darker colored with depth. No unusual odors.	0.8	SP		
					1.4			
				Encountered apparent boulder at 5' bgs. Moving drill rig ~ 10' southeast.	0.6	SP		
5					1.2			
	Run #2 5 - 9	4.3	1205	5-7' Brown to dark brown fine to coarse sand and gravel. Moist, massive, wide range of grain size.	13			
					8			
				7-9' Olive brown to olive fine to coarse sand and gravel with some silt and small cobbles. Moist, massive, siltier cohesive layer (7.5-8'). No unusual odors or staining.	37	SW/GW		
	OC-SB-424-7/9-XXX		1215	Encountered what appears to be concrete at 9 ' bgs.	12		YES	
	Run #3 9 - 15	5.3	1220	9-11' Light gray to olive gray fine to coarse sand and gravel with traces of cobbles and silt. Some layering with dry and very moist layers.	31			
10					6	GW/GM		
				11-15' Dark olive gray fine to coarse sand and gravel with some silt and cobbles. Very moist, with some siltier cohesive areas/layers.	98			
					117			
						GW/GM		
15					124			

Notes

Jerry K. Rawcliffe

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MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-424**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 4 7/8" OD inner casing/ 6" OD outer casing**
Logged By: Jerry Rawcliffe	**Auger ID/OD: NA**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/19/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 8	**Water Level: 8.5'**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 19	4.6	1230	15-17.5' Dark olive gray fine to coarse sand and gravel with some silt and cobbles. Very moist, massive, wide range of grain size.	4.9			
					6.2	GW/GM		
				17.5-19' Olive gray to light olive brown fine to coarse sand and gravel with cobbles and some silt. Wet, massive, bottom of sample has a mottled appearance.	8.4			
	OC-SB-424-20/22-XXX		1235				YES	
				Encountered what appears to be bedrock at 19' bgs.	2.4			
20				Did not get any recovery of rock. Bottom of boring = 19.2 feet bgs.				
25								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, NC.
Client: OLIN
6107090016 4

Boring: SB-425
File No.:

Contractor: Boart Longyear	Drilling Method: Roto sonic
Operator: Dale Dyschler	Bore Hole ID/OD: Inner OD 4"/6" / Outer OD 6".
Logged By: Jerry Ratcliffe	Auger ID/OD: NA
Checked By: C. Mazzolini	Sampler: Dave Chapman
Date Start/Finish: 8/19/09	Hammer Wt./ Fall: NA
Boring Location: Area 8	Water Level[3]: 7.5' Based on soil observation
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	3.9	0950	0-1.2 light brown to brown fine to medium sand with a little coarse sand and gravel. Dry, no apparent structure, wide range grainsize. PID=0.9	SW/GW	Y	
	OC-SB-425-0-1.0-XX		0955				
				1.2-5.0 Dark brown fine to medium sand with some to a little coarse sand and gravel. Moist, massive, no unusual odors detected. = 5.8 = 2.9 = 3.2	SW		
5							
	Run#2 5-10	4.7	1000	5-7.8 Brown fine to medium sand, very moist, uniform grain size, no apparent structure. PID=14 = 52	SP	Y	
	OC-SB-425-6.0-8.0-XX		1005				
				7.8-10.0 Brown to dark brown fine to medium sand, very moist to wet, uniform grain size, no obvious odors. = 68 = 90 PID = 110	SP		
10							
	Run#3 10-15	5.3	1010	10-10.8 Brown to dark brown fine to medium sand with some cobbles at 10.5'. wet., massive PID=46	SP		
				10.8-13.0 Dark brown to very dark grayish brown fine to coarse sand and gravel with cobbles Very moist to wet. wide range of grain size. = 12	GW		
				13.0-13.8 Olive to olive brown fine-medium sand with silt and some coarse sand and gravel = 11	GW/GM		
				13.8-15 Olive fine to coarse sand with some silt and gravel. very moist. = 16 PID=19			
15							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Ratcliffe

Boring: SB-425

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington MA
Client:	OLIN
	6107090016-09

Boring: SB-425
File No.:

Contractor:	Boart Longyear	Drilling Method:	RotoSonic
Operator:	Dale Dusablet	Bore Hole ID/OD:	4 7/8 OD inner casing / 6 OD overcasing
Logged By:	Jerry Rawcliffe	Auger ID/OD:	NA
Checked By:	C. Manzolini	Sampler:	Dave Chapman
Date Start/Finish:	8/14/09	Hammer Wt./ Fall:	NA
Boring Location:	Area 8	Water Level[3]:	7.5 based on soil observations.
Ref. Elevation[1]:			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined CompressiveStrength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #4 15-20	4.9	1020	15-17.5 Olive to olive grey fine to coarse sand and gravel with some silt. Wet, massive PID=0.4	GW/GM		
				17.5-19 Olive brown to olive grey fine to coarse sand and gravel with some silt and cobbles, very moist to wet, mottled. =3.2	GM		
				19-20 Grey to olive grey fine to coarse sand and gravel with some silt. Very moist to wet, massive. =5.4	GM		
20	OC-SB-425-18-20	XXX	1025	=2.8		Y	
	Run #5 20-23	3.5	1030	20-22.5 Grey to olive grey fine to coarse sand and gravel with some silt and cobbles. Very moist to wet, massive PID=0.4	GM		
				22.5-23.0 light grey fine sand silt and cobbles with some medium to coarse sand and gravel. =1.5			
				Appears to be rock flour/bedrock. =0.6			
				Estimated top of bedrock = 22.5' BGS			
25				Bottom of boring = 23.0' BGS			

Notes

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Jerry Rawcliffe

Boring: SB-425

MACTEC

	Project: Olin Chemical Superfund Site	Boring: SB-426
	Location: Wilmington MA	File No.:
	Client: Olin	

Contractor: Boart Longyear	Drilling Method: RotoSonic	**Definitions:**
Operator: Dale Dueckel	Bore Hole ID/OD: Inner 4 7/8 / Outer 6"	S = Split Spoon Sample
Logged By: Jenny Rawcliffe	Auger ID/OD: NA	U = Thin Wall Tube Sample
Checked By: C. Macroglin	Sampler: Dave Chapman	R = Rock Core Sample
Date Start/Finish: 8/19/09	Hammer Wt./ Fall: NA	V = Insitu Vane Shear Test
Boring Location: Area 5	Water Level[3]: 8.5' Measured in borehole	q_p = Unconfined CompressiveStrength (psf)
Ref. Elevation[1]:		woh = weight of 140 lb. hammer
		wor = weight of rods
		wc = Water Content, percent
		oc = Organic Content, percent

Depth	Sample No. (Sample Information)	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	3.3	1410	0-0.2 Asphalt PID = 0.2			
	OC-SB-426-0.0-1.0	XXX	1415	0.2-3.0 Dark brown to dark olive brown fine to medium sand with a little gravel. =0.6 Contained a piece of plastic ± 1/2" thick possible	SP		
5				section of plastic pipe (large diameter) Fill. = 0.4 3.0-5. Light brown fine to medium sand. = 0.3 Moist, no apparent structure, some reddish staining which appears to be iron staining. = 0.9	SP		
	Run #2 5-7	1.9	1420	5-7 Brown fine to medium no apparent structure. cobble gravel			
	OC-SB-426-5.0-7.0	XXX	1425	at bottom of recovery	SP		
	Boulder 7.5-9	-	-	Bo der			
				P			
10	Run # 3 9-15	6.1	1430				
				9-15' Olive to olive grey coarse sand and gr th silt. Wet, massive s tled , rarce	SW		
	OC-SB-426-13-15	XXX	1435				
15				0 3			

Notes

1/2" I  piece of plastic (pipe?) encountered in Run #1

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Jenny Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington MA.
Client: Olin

Boring: SB-426
File No.:

Contractor: Boart Longyear	Drilling Method: RotoSonic
Operator: Dale Dischert	Bore Hole ID/OD: Inner 4"/6.00/Outer 6" OD
Logged By: Jerry Rawcliffe	Auger ID/OD: NA
Checked By: C. Mandolini	Sampler: Dave Chapman
Date Start/Finish: 8/19/09	Hammer Wt./ Fall: NA
Boring Location: Area 5	Water Level[3]: 8.5 measured in borehole
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15'	Run #4 15-16.5	2.0	1440	15-16 Olive gray to gray fine to sand and gravel with stones/silt wet massive, wide range of grain size. PID 10= 1.3, 0.7, 0.5	SW/GW		
				16-16.5 Gray to dark gray fine sand silt with pebbles gravel and medium to coarse sand. (Appears to be pulverized rock).	GM		
20				Estimated top of bedrock = 16.0' BGS Bottom of boring = 16.5' BGS			

Notes

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Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin.

Boring: SB-427
File No.:

Contractor: Boart longyear
Operator: Greg Halliday
Logged By: Terry Rawcliffe
Checked By: CTM
Date Start/Finish: 9/10/09
Boring Location: Area 8
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing/6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 29-10' Based on soil observations

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #4 15-20	4.8	1435	15-19 Brown medium to coarse sand with a trace of gravel. Wet, light reddish brown layer 2cm thick at ~18.5'BGS slight organic odor. PID = 28 = 21	SP		
				19-20 Dark gray to very dark gray gravel with a little medium to coarse sand. Wet = 23	GP	(N)	
	OC-SB-427-17/19-222		1505				
				20-21 = 6.8		Yes	
	Run #5 20-22	3.0	1455	Olive gray to dark brown medium to coarse sand with traces of gravel and silt. Wet, massive. Recovery may be cause by direct vibrations of rig encountered very hard material from ~21-22 PID = 8.4 = 4.1 = 5.5			
				Feet BGS - No recovery of the dense material. Estimate top of bedrock = 21' BGS Bottom of Boring = 22' BGS.			

Notes

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Terry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-427
File No.:

Contractor: Boart Longyear
Operator: Greg Halliday
Logged By: Terry Rawcliffe
Checked By: CTM
Date Start/Finish: 9/10/09
Boring Location: Area 8
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4"/8.00 inner casing/6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 9-10' BGS based on soil observations

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	3.3	1335	0-0.2 Asphalt			
	OC-SB-427-0/1.0	-XXX	1340	0.2-1.0 - Brown fine to coarse sand and gravel with a trace of silt. (Pavement subgrade). PID=0.5	SW		
				1-4 Brown to dark brown medium sand with a little fine and coarse sand and a trace of gravel. Moist, relatively uniform. =0.3	SP		
				4-5 light brown to strong reddish brown fine to medium sand with traces of silt. Moist. ≥0.2 =0.5 ≥0.8			
	Run#2 5-10	3.5	1340	5-10 light brown to brown medium sand with a little fine sand, Moist to very moist, some slight stratification of color. Grain size very uniform. PID=0.5 =0.2 =1.2	SP		
				=6.1			
	OC-SB-427-8/10 DUP/KMS/MS D	-XXX	1400	=18			
	Run#3 10-15	2.5	1410	10-12 Brown medium sand little fine to coarse sand	SP		
	OC-SB-427-12/14	-XXX	1435	12-13 Grayish brown medium little fine to coarse sand.			
				13-15 Gray to dark gray medium sand with some coarse sand and a little fine sand. Wet, strong organic odor	SP		

Notes

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Terry Rawcliffe

Boring: SB-427

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: SB-427
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/10/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 8	**Water Level: 9-10' bgs based on soil observations**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	3.3	1335	0-0.2' Asphalt	0.5			
	OC-SB-427-0/1.0-XXX		1340			SW	YES	
				0.2-1' Brown fine to coarse sand and gravel with a trace of silt (Pavement subgrade).	0.3			
					0.2			
				1-4' Brown to dark brown medium sand with a little fine and coarse sand and a trace of gravel. Moist, relatively uniform.		SP		
					0.5			
				4-5' Light brown to strong reddish brown fine to medium sand with traces of silt. Moist.				
5					0.8			
	Run #2 5 - 10	3.5	1340		0.5			
				5-10' Light brown to brown medium sand with a little fine sand. Moist to very moist, some slight stratification of color, grain size very uniform.	0.2			
					1.2			
						SP		
					6.1		YES	
	OC-SB-427-8/10-XXX		1400		18			
10	DUP/XMS/MSD							
	Run #3 10 - 15	2.5	1410	10-12' Brown medium sand with a little fine to coarse sand. Wet.				
					180	SP		
				12-13' Grayish brown medium sand with a little fine to coarse sand.	440			
				13-15' Gray to dark medium sand with some coarse sand and a little fine sand. Wet, strong organic odor.		SP		
					4010			
15								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: SB-427
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/10/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 8	**Water Level: 9-10' bgs based on soil observations**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	4.8	1435	15-19' Brown medium to coarse sandwich a trace of gravel. Wet, light reddish brown layer 2cm thick at ~18.5' bgs. Slight organic odor.	4.9	SP		
					6.2			
					8.4			
	OC-SB-427-17/19-XXX		1505				YES	
				19-20' Dark gray to very dark gray gravel with a little medium to coarse sand. Wet.	2.4	GP		
20								
	Run #5 20 - 22	3.0	1455	20-21' Olive gray to olive brown medium to coarse sand with traces of gravel and silt. Wet, massive. Recovery may be cave-in due to vibration of rig - encountered very hard material from 21-22' bgs. No recovery of dense material.				
				Estimate top of bedrock = 21' bgs.				
				Bottom of boring = 22 feet bgs.				
25								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: SB-427

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring:
File No.: SB-428

Contractor: Boart Longyear
Operator: Paul Chapman
Logged By: Jerry Rowcliffe
Checked By: CTM
Date Start/Finish: 9/10/09
Boring Location: Area 8
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Jerry Rowcliffe
Hammer Wt./ Fall: NA
Water Level[3]: 9-10' based on observation

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	#1 Run 0-5'	3.5	15:55	0-0.2 = Asphalt 0.2-1.0 = Mostly med gray-brown. silty sand PID=0.3 1.0-3.0 = Brown-dark brown trace silt and gravel, moist, mostly uniform ed sand PID 0.3	SW SP	Yes	
				3-4 = Mostly light brown - reddish brown medium sand w/ trace fine. medium sand, trace silt. moist, red striations/bands at 3.2 4-5 = Mostly tan medium sand, some fines, uniform, trace silt, moist PID-0.3	SP		
#2	Run 5-10'	3.8	16:05	5-6 = Mostly brown-light brown medium sand, some fines, trace silt PID-1.7	SP	Yes	
	oc-SB-428-8.0	10.0-x	16:20	6-10 = Mostly light brown medium sand, some fines, some gravel, trace cobble, uniform, moist PID: 3.4			
#3	Run 10-15	4.3	16:40	10-11 = Mostly brown medium sand some fines, some coarse, slight odor moist 11-11.5 = Mostly brown-dark brown med sand, trace fines, odor, moist	SP	PID:	1.5 1.7
				11.5-15 = Mostly brown-dark gray brown med-coarse sand, uniform, wet, odor.	SW SP	PID	1.5
#4	Run 15-20	3.5	17:00	15-20 = Mostly brown-reddish brown med-coarse sand, uniform wet.	SW SP		1.6 1.6 1.7

Notes

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MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring:
File No.: SB-428

Contractor: Boart Longyear
Operator: David Chapman / Greg Wallace
Logged By: Jerry Rawcliffe
Checked By: cm
Date Start/Finish: 9/10/09
Boring Location: Area B
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Jerry Rawcliffe
Hammer Wt./ Fall: NA
Water Level[3]: 9-10' based on observations

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
w = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
#5	Run 20-25	2.2	17:30	20-23: Mostly brown-dark brown med-coarse sand; wet. ~~boulder at 2 (ow)~~			
	OC-SB-428-23	25-xx	17:40	23-25: Mostly brown, coarse some gravel, wet. cobbles @ 25', boulder approx 4" in diameter	GW	yes	PID = 0.5
							0.
							0.
				25' = end of boring			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Page 2 of 2

Boring: SB-428

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-429
File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic
Operator: Dale Dyckett	Bore Hole ID/OD: 4 7/8" OD, inner casing/6" OD overcasing
Logged By: Jenny Rawcliffe	Auger ID/OD: NA
Checked By: ctm	Sampler: Dave Chapman
Date Start/Finish: 8/25/09	Hammer Wt./ Fall: NA
Boring Location: Area 6	Water Level[3]: 10.2' BGS measured in borehole
Ref. Elevation[1]:	≈8' BGS Based on soils - wet at bottom of peat

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	3.2	1245	0-2.0 Gravel rip-rap (ballast) for RR tracks. PID = 17	GP		
				=15			
				2-5' Dark brown fine to medium sand with a little gravel coarse sand and trones of cobbles. Broken cobble zone at ≈ 3-3.5' BGS. Moist			
				=19	SP		
5				=21			
	Run #2 5-10	5.0	1250	5-6.5 Grey/dk brown gravel with some fine to coarse sand. Moist PID = 19	GW/GP		
				6.5-7 Brown to dark brown fine to medium sand with little to trones of coarse sand and gravel. and some well decomposed organic debris. Becomes finer with depth. =17	SP/SM	Yes	
	OC-SB-429-6/8-XXX		1300	=0			
				7-9 - Very dark brown to black peat with trones of fine sand. Well decomposed =0	SP		
10				9-10 Brown to dark brown fine to coarse sand with a little gravel and decomposed organics =0.6	Pt		
	Run #3 10-15	3.3	1310	10-13' Grey to olive grey silt and fine sand with a little to trones of medium to coarse sand and gravel. Very wet, poor recovery as sample liquified during drilling. PID = 0 =0	Wet. SM	Yes	
	Sample was quite disturbed by drilling process.						
				13-15 Grey fine to coarse sand and gravel and silt with some cobbles. Wet. =0	GM		
15							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jenny Rawcliffe

Boring: SB-429

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-429
File No.:

Contractor: Boart Longyear	Drilling Method: Rotosonic
Operator: Dale Dyschler	Bore Hole ID/OD: 4 7/8" OD inner casing/6" OD outer casing
Logged By: Jenny Rawcliffe	Auger ID/OD: NA
Checked By: GM	Sampler: Dave Chapman
Date Start/Finish: 8/25/09	Hammer Wt./ Fall: NA
Boring Location: Area 6	Water Level[3]: 10.2' Measured in borehole
Ref. Elevation[1]:	≈ 8' Based on soil (wet at bottom of core).

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-19	3.1	1320	15-16.5 Gray silty gravel with fine to coarse sand. PID = 0 ppm			
	OC-SB-429-16/18-Xaa		13:25	sand with traces of cobbles. Wet, mussels.			
				16.5-18 Gray to olive gray fine to coarse sand and gravel with silt and traces of cobbles. Very moist to wet. = 0			
				18-19' light gray gravel and cobbles (rock flour (silt), fine sand with traces medium to coarse sand) = 13			
20	XX	XX	XX	Dry. = 137 ppm			
				Estimate top of rock = 18' BGS			
				Bottom of boring = 19' BGS			
25							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jenny Rawcliffe

Boring: SB-429

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-430
File No.:

Contractor: Boart Longyear
Operator: Dale Dyschler
Logged By: Jerry Rawcliffe
Checked By: CTh
Date Start/Finish: 8/25/09
Boring Location: Area 6
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 4 7/8" OD inner casing/6" OD outer casing
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 6-8' Based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psi)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	4.2	1445	0-1.6 light brown fine to medium sand with a little gravel and coarse sand. Dry to moist, some root fibers. PID = 0	SP/SW		
	OC-SB-430-0/10-XXX		1450	1.6-4.0 Brown to dark brown fine to medium sand with some coarse sand and gravel and traces of cobbles and silt. Moist, mostly sand except for some changes in color. =0	SW/GW		
5				4-5 Brown to dark brown fine to medium sand with a little silt and some decayed organic material. Moist, No odor Measured. =0			
	Run#2 5-10	5.2	1450	5-6 Brown to dark brown fine to medium sand with a little to a trace of silt. Very moist. PID = 0			
				6-8 Very dark brown to black to dark brown fine to medium sand with a little silt and some decomposed organics. (Tannic staining from nearby Peat?) Wet. =0			
				8-9 Olive to light olive gray fine to coarse sand and gravel with some cobbles and traces of silt (Dry-Broken up cobble layer.)			
10	OC-SB-430-8/10-XXX		1500	9-10 Dark olive fine to coarse sand and gravel with some silt and traces cobbles. Moist to very moist in some.			
	Run#3 10-15	3.8	1500	10-12 Gray to dark gray fine to medium sand with gravel and cobbles and silt. Wet/massed PID = 0	GM		
				12-15 Olive gray to gray fine to coarse sand and gravel with some silt. Very moist to wet. =0	GM/SW		
				=0			
15				=0			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-430
File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic
Operator: Dale Drischler	Bore Hole ID/OD: 4 7/8" OD inner casing / 6" OD over casing
Logged By: Jerry Rawcliffe	Auger ID/OD: NA
Checked By: CTM	Sampler: Dave Chapman
Date Start/Finish: 8/25/09	Hammer Wt./ Fall: NA
Boring Location: Area 6	Water Level[3]: 6-8' Based on soils
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-22	6.2	1515	15-19 Gray gravel with fine to coarse sand and some cobbles and silt. Wet, massive. PID=0	GW/GM		
				19-21 Gray to olive to olive brown fine to coarse sand and gravel with some silt and traces of cobbles. Very moist to wet, massive =0			
20	OC-SB-430-19/21-XXX		1535	21-22 Light gray gravel and rock flour with some small cobbles. =0	GW/GM		
				Encountered hard material estimated top of rock at 21' BGS =0			
				Bottom of boring = 22' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

21 → 22 Jerry Rawcliffe

Page 2 of 2
Boring: SB 430

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington MA.
Client: Olin

Boring: SB-431
File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic
Operator: Dale Dyschler	Bore Hole ID/OD: 4 7/8 / 6"
Logged By: Jerry Rauchliffe	Auger ID/OD: NA
Checked By: C. Mandolini	Sampler: Dave Chapman
Date Start/Finish: 8/30/09	Hammer Wt./ Fall: NA
Boring Location: Area 5	Water Level[3]: ≈ 7-8' (Wet soils in 6' core)
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1	3.5	1010	Concrete 0 - ~~5.0~~ 3.0			
		(2)	~~1015~~	~~3.0-4~~ Brown fine to medium sand, moist, 3.0-3.5 massive, uniform grain size (Fill). PID=6.1	SP		
				3.5-4 Concrete			
				4-5 Brown fine to coarse sand with gravel and traces of silt and cobbles. Moist, to very moist, massive PID=5.1	SW	Yes	
5							
	Run #2 5-9	4.8	1000	5-6 Olive gray to olive brown fine to coarse sand and gravel with a little silt and cobbles. Moist, massive some concrete fragments PID=0.9	SW/GW		
				6-9 Dark brown to dark brown fine to coarse sand and gravel with a little silt and trace cobbles. Very moist to wet wide range of grain size, massive. =0.6 ≤ 6.1 =0.4		Yes	
	UC-SB-431-7/9-XX	X	1025				
			(23)	~~Concrete~~ at ≈ 9' BGS Boulder			
10							
				Drilled 9-12.5 into boulder. - Going to move south ± 5' and redrill. Bottom of 1st attempt 12.5' BGS			

Notes
A5-P5

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rauchliffe

Boring: SB-431

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington MA.
Client: Olin

Boring: SB-431
File No.: (Redrill)

Contractor: Boart Longyear
Operator: Dale Dyschot
Logged By: Jerry Rawcliffe
Checked By: C. Mazzeo
Date Start/Finish: 8/20/09
Boring Location: Area 5
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 4 7/8" / 6"
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: NA

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
				SB-431 1st attempt hit boulder/bedrock at 9-12.5' Moved ~5' south for this 2nd attempt. Screened recovery from 0-8 PID ranged from 0.1 to 1.2 ppm material similar to 1st attempt except less concrete			
10				encountered from 0-5'. 2nd attempt encountered boulder/bedrock at ~8-8.5' BGS Going move onto the next location.			
				Bottom of boring = 8' 2nd Attempt			
15							
20							

Notes

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Jerry Rawcliffe

Boring: SB-431

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington MA.
Client: Olin

Boring: SB-432
File No.:

Contractor: Boart Longyear
Operator: Dale Duschet
Logged By: Jenny Ranchiffe
Checked By: C. Mandini
Date Start/Finish: 8/20/09
Boring Location: Area 5
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 4 7/8" / 6"
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: Est 7-8' Based on soil observation.

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	3.3	1430	~~Concrete~~ PID=0.6			
	OC-SB-432-0/1.0-XXX		1435	0-1.5 light brown very fine to coarse sand and gravel with a little silt. Dry, massive, (Fill) = 18.6	GW	YES	
				some roots and a fragment of metal debris.			
				1.5-5.0 Dark brown to dark grayish brown = 74			
				fine to medium sand. Moist massive, = 55	SP		
5				Sweet organic odor. Uniform grain size. PID=88			
	Run #2 5-10	4.8	1435	5-6 Similar to 1.5-5.0 sample. PID=52	SP		
				= 34		YES	
	OC-SB-432-5/7-XXX		1440	6-10 Brown fine to medium sand. Very moist to wet, massive. Sweet organic odor.	SP		
				Soils contain material that leaves = 110			
				sticky residue on gloves and sampling equipment = 84			
10				= 100			
	Run #3 10-15	5.1	1445	10-12 Concrete			
				12-15 Fine to coarse sand and gravel with PID=20			
				some cobbles and a little silt. layers of different	GW		
				colored material = 0.5-1.0" thick = 13			
				Olive (moist) to olive brown, to light olive gray, to very = 5.4			
				pale brown (dry), to olive, moist to dark gray moist. = 3.1			
15	OC-SB-432-14/16-XXX		1515			YES	

Notes
A5-P6

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jenny Ranchiffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-432
File No.:

Contractor: Boart Longyear
Operator: Dale Deschler
Logged By: Jerry Rawcliffe
Checked By: C. Mardin
Date Start/Finish: 8/20/09
Boring Location: Area 5
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 4 7/8 inner casing / 6" outer casing
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: Est. 7-8' Based on soil observations

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run # 4 15-17	1.4	1505	Dark olive brown fine to medium sand with a little or traces of coarse sand and gravel. PID=110ppm 16' Encountered possible top of rock. ~~Paint~~ Globules, Not soluble in H_2O, PID=85 Drilled to 17' Same as 6-10' CTM 8/21/09	~~SM~~ SW	(B)	
				Bottom of boring = 17.0' BGS Top of bedrock estimated to be 16.0' BGS.			
20							

Notes

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Jerry Rawcliffe

Boring: SB-432

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-433
File No.:

Contractor: Boart Longyear	Drilling Method: Roto sonic
Operator: Dale Dyches	Bore Hole ID/OD: 4"/6"
Logged By: Jerry Ranuffle	Auger ID/OD: NA
Checked By: CTM	Sampler: Dave Chapman
Date Start/Finish: 8/31/09	Hammer Wt./ Fall: NA
Boring Location: Area 4	Water Level[3]: 8-8.5 Measured in borehole w casing
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	3.9	0810	0-0.2 Asphalt PID=0 ppm			
	oc-SB-433-0/1.0-XXa		0815	0.2-1.1 Brown to dark brown fine to medium sand with a little gravel and lenses of coarse sand. Moist. some grey material along layers at 0.5'. Partly uniform grain size =0	SP	YES	
				1.1-1.3 Very dark brown to black fine to medium sand. Moist, massive, no unusual odors =0			
5				1.3-5' Brown becoming lighter brown with depth fine to medium sand. Moist, massive, no unusual odors =0	SP		
	Run#2 5-10	4.9	0815	5-7' Brown to light brown fine to medium sand with lenses of coarse sand. moist to very moist, some reddish/orange staining 6-7' (appears to be iron staining). PID =0.6 =1.2 ppm		Yes	
	oc-SB-433-5/7-XXa		0820				
	XXD						
	XXS						
	XXD						
				7-10' Brown fine to medium sand, very moist to wet, slight stratified appearance. No unusual odors. uniform grain size. PID =3.6 =0 =0	SP		
10							
	Run#3 10-15	5.0	0820	10-11.5 Brown fine to medium sand and gravel with a little coarse sand. Very moist to wet saturated. PID =0	GP/GW		
				11.5-13 Brown to olive brown fine to coarse sand with some gravel, coarse sand and cobbles and silt. No unusual odors detected =0 =0.2			
				13-15 Olive to olive brown fine to coarse sand and gravel with some silt and lenses cobbles. Very moist to wet, massive, wide range of grain sizes. Some darker stained/colored layers. PID =0 ppm =0.7	GW		
15							

Notes

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Jerry Ranuffle

Boring: SB-433

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-433
File No.:

Contractor: Boarthomyer
Operator: Dale Dysher
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 8/24/09
Boring Location: Area 4
Ref. Elevation[1]:

Drilling Method: Rotosonic.
Bore Hole ID/OD: Innercasing OD 4 7/8/Outercasing OD 6"
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ≈8-8.5' measured in borehole on core.

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-23	5.9	0835	15-16.5 Olive to olive brown fine to medium sand with some coarse sand gravel, and a little cobbles and silt, dry moist to wet, massive. wide range of grain size. PID=0.4 =0	GW/GM		
20				16.5-18' Olive to olive brown to Olive gray fine to medium sand with some silt and coarse sand and gravel some cobbles. Very moist to wet, massive. =0.2 =0 18-21.5 Olive to olive gray to olive brown fine to coarse sand and gravel with a little silt and some cobbles. 21-21.5 some lydite yellowish cohesive. =0.1 =0.2	GW/GM		
	OC-SB-433-20/22	X+D	0850	21.5-23 Light to gray silt + fine sand rock flour with gravel and cobbles med to coarse sand. (Pulverized rock).			
25				Estimate top of rock at 21.5' BGS Bottom of boring = 23' BGS.			
30							

Notes
21.5

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: SB-433
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/24/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 8-8.5' bgs measured in borehole with casing**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	3.9	810	0-0.2' Asphalt	0.5			
	OC-SB-433-0/1.0-XXX		815	0.2-1.1' Brown to dark brown fine to medium sand with a little gravel and traces of coarse sand. Moist, some gray material along layer ` 0.5' bgs, fairly uniform grain size.	0.3	SP	YES	
					0.2			
5				1.1-1.3' Very dark brown to black fine to medium sand . Moist, no unusual odors, leaves a slight stain on gloves.	0.5			
				1.3-5' Brown becoming lighter brown with depth fine to medium sand . Moist, massive, no unusual odors.	0.8	SP		
	Run #2 5 - 10	4.9	815	5-7' Brown to light brown fine to medium sand with traces of coarse sand. Moist to very moist, some reddish/orange staining6-7'bgs (appears to be iron staining).	0.5			
					0.2		YES	
	OC-SB-433-5/7-XXX		820		1.2			
	-XXD					SP		
	-XMS							
10	-MSD			7-10' Brown fine to medium sand . Very moist to wet, slight stratified appearance. No unusual odors. Uniform grain size.	6.1			
					18			
	Run #3 10 - 15	5.0	820	10-11.5' Brown fine to medium sand and gravel with a little coarse sand. Very moist to wet, massive.				
					180	GP/GW		
				11.5-13' Brown to olive brown fine to coarse sand with some gravel and a little cobbles and silt. No unusual odors detected.				
					440			
				13-15' Olive to olive brown fine to coarse sand and gravel with some silt and traces cobbles. Very moist to wet, massive, wide range of grain sizes. Some darker stained/colored layers		GW		
15					4010			

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: SB-433

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-433**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/24/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 8-8.5' bgs measured in borehole with casing**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 23	5.9	835	15-16.5' Olive to olive brown fine to medium sand with some coarse sand and gravel and a little cobbles and silt. Very moist to wet, massive, wide range of grain sizes.	4.9	GW/GM		
				16.5-18' Olive to olive brown to olive gray fine to medium sand with silt and coarse sand, gravel, and traces of cobbles. Very moist to wet, massive.	6.2			
					8.4			
20				18-21.5' Olive to olive gray to olive brown fine to coarse sand and gravel with a little silt and traces of cobbles. 21-21.5' some lighter yellowish coloring.	2.4	GM		
	OC-SB-433-20/22-XXX		850	21.5-23' Light gray silt and fine sand - rock flour with gravel and cobbles and medium to coarse sand (Pulverized rock).			YES	
				Estimate top of rock at 21.5 feet bgs. Bottom of boring = 23 feet bgs.				
25								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: **SB-433**

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-434
File No.:

Contractor: Boart Longyear
Operator: Greg Halliday
Logged By: Jerry Rawcliffe
Checked By: CTH
Date Start/Finish: 9/10/09
Boring Location: Area 8
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4"/8.00 inner casing/6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ≈5-9' BGS based on soil boring observations

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	2.4	0740	0-0.2 Asphalt. PID=0.3			
	OC-SB-434-0/1.0-XXX		0750	0.2-2' Brown to dark brown fine to coarse sand and gravel with traces of silt. Moist =0.4	SW	Yes	
				massive Asphalt/road-subgrade			
				2-5 Brown medium sand with a little =0.8	SW/		
				fine to coarse sand and traces of gravel.			
5				Moist. plastic pipe est ⅛" thick =2.6	SP		
				Piece of ~~wood~~ jammed in barrell limited recovery.			
	Run #2 5-10	3.3	0800	5-6 Brown to dark brown fine to medium P 1.8			
				sand with a trace of coarse sand and gravel. Moist.			
				6-7 light slightly reddish brown medium sand =0.4	SP		
				with a little fine sand and coarse sand.			
				7-8 light brown medium sand with a			
	OC-SB-434-7/9-XXX		0815	little fine sand. One thin brown layer		Yes	
				8-10 Brown to slightly reddish brown	SP		
10				to medium sand. Very moist to wet			
				Pieces of iron pipe 6-8" Diameter recovered. 6.2			
	Run #3 10-15	3.9	0835	15-17.5 Dark brown to olive brown to PID=2.1	SP		
				olive gray fine to medium sand with a trace of silt. Reddish brown stained layer at 17.5' BGS =1.3			
				17.5-18 Brown fine to coarse sand and gravel	GW		
				with a little to a trace of silt, Wet.			
				18-20 Olive to olive brown fine to coarse sand =0.4			
				and gravel. Wet, massive	GW/		
15				20.2	GW		

Notes

Encountered something very hard on Run #2 concrete? cobbles sample barrel-soils very hot. (steam rising off soil sample)

recovered pieces of metal (cast iron?) pipe (6-8" Diameter) from ≈ 6-9' BGS

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Boring: SB-434

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-434
File No.:

Contractor: Boart longyear	Drilling Method: RotoSonic
Operator: Corey Dalldorf	Bore Hole ID/OD: 6" OD
Logged By: Terry Rawcliffe	Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Checked By: CTim	Sampler: Dave Chapman
Date Start/Finish: 9/10/09	Hammer Wt./ Fall: NA
Boring Location: Area 8	Water Level[3]: 8-9' BGS based on soil boring observations
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-16	1.8	0930	15-16 Dark olive to dark olive gray fine to coarse sand with some silt, gravel, and trace of cobbles. Wet, massive. No unusual odors detected. PID=0.2 =0.2	GM	Yes	
	DC-SB-434-15/16-Run4		0935				
20				Encountered very hard material at 15.5-16' unable to penetrate with rotosonic. Possible refusal on boulder? Bottom of boring = 16' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Terry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-435
File No.:

Contractor: ZEBRA
Operator: Jason Fredericks
Logged By: Jerry Rawcliffe
Checked By: Chris Marrotta
Date Start/Finish: 9/17/09
Boring Location: Brent
Ref. Elevation[1]:

Drilling Method: Direct Push
Bore Hole ID/OD: 1.5"/3" (estimate)
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: GW at ≈0.5' BGS

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Sleeve #1 0-5	2.3	1315				
	*OC-SB-435-0.0/1.0	xxx	1445	0-1.0 Very dark brown organic debris roots, leaves decayed organic matter. Boggy, swamp deposit. Wet PID = 0	PT	YES	
				1.0-2.5 Dark brown fine to coarse sand and organic matter. Wet stratified with organic layers and sand layers.	SP		
5				2.5-5 Orange to brown fine to coarse sand and gravel. Wet, massive. PID = 0	GW		
	Sleeve #2 5-10	2.6	1330	5-10 Grey to dark grey fine to coarse sand and gravel with a trace of silt. Wet, massive. PID = 0	GP/GW		
				≈0			
	OC-SB-435-6.0/10	xxx	1335			YES	
10				≈0			
	Sleeve #3 10-15	1.9	1340	10-15 Grey to dark grey fine to coarse sand and gravel with a trace of silt and cobbles. Wet, massive. PID = 0.2	GW/GP		
				≈0.1			
	OC-SB-435-11/15	xxx	1400			YES	
15							

Notes

Refusal at 15' was a combination of heavy in extremely dense/hard material and the inability to retrieve the sample tube from the material - It may have been possible to penetrate the material for another foot or so but with increasing likelyhood of loosing the sample and equipment. Offset and redrilled to 15' to get enough sample for the various analyses.

Refusal at ≈15' BGS
Bottom of boring = 15' BGS

*Collected surface soil sample after boring completion using sporke and ss bowl+spoon.

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Page 1 of 1
Boring: SB-435

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: SB-435
File No.:

Contractor: Zebra	**Drilling Method: Direct Push**
Operator: Jason Fredericks	**Bore Hole ID/OD: 1.5"/3" (estimate)**
Logged By: Jerry Rawcliffe	**Auger ID/OD: NA**
Checked By: Chris Mazzolini	**Sampler: Dave Chapman**
Date Start/Finish: 9/17/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 1	**Water Level: GW at ~ 0.5' bgs**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Sleeve #1 0 - 5	2.3	1315	0-1' Very dark brown organic debris, roots, leaves, decayed organic matter. Boggy swamp deposit. Wet.	0	Pt	YES	
	*OC-SB-435-0/1.0-XXX		1445					
				1-2.5' Dark brown fine to coarse sand and organic matter. Wet, stratified with organic layers and sand layers.	0	SP		
					0			
				2.5-5 ' Olive gray to brown fine to coarse sand and gravel. Wet, massive.	0	GW		
5								
	Sleeve #2 5 - 10	2.6	1330	5-10' Gray to dark gray fine to coarse sand and gravel with traces of silt. Wet, massive.	0	GP/GW		
					0			
	OC-SB-435-6/10-XXX		1335				YES	
10	\				0			
	Sleeve #3 10 - 15	1.9	1340	10-15' Gray to dark gray fine to coarse sand and gravel with a trace of silt and cobbles. Wet, massive.	0.2	GW/GP	YES	
	OC-SB-435-11/15-XXX		1900		0.1			
				Refusal at ~ 15' bgs. Bottom of boring = 15' bgs.				
15								

Notes * Collected surface soil sample after boring completion using spade and stainless steel bowl and spoon.

Refusal at 15' was a combination of being extremely dense /hard material and the inability to retrieve the sample tube from the material. It may be possible to penetrate the material for another foot of so but with increasing likelihood of loosing the sample and equipment. Offset and redrilled to 15' to get enough sample for the various analyses.

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: SB-435

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-436
File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic
Operator: Dale Duschett	Bore Hole ID/OD: 4 7/8"/6"
Logged By: Jenny Rawcliffe	Auger ID/OD: NA
Checked By: C. Mondini	Sampler: Dave Chapman
Date Start/Finish: 8/20/09	Hammer Wt./ Fall: NA
Boring Location: Area 5	Water Level[3]: ~~8'~~ Based on soil observations
Ref. Elevation[1]:	10' measured in borehole

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	3.3	1300	0-0.3 Concrete. PID=0.1			
	OC-SB-436-0/1.0-XXX		1305	0.0.5 light brown fine to coarse sand and gravel with some small cobbles and concrete rubble.	SM	Yes	
				0.5-3.5 Brown to dark brown fine to medium =0.8			
				sand with a little gravel and traces of small cobble or brick fragments, Dark brown. material appears to be organic debris. Uniform =0.2	SP		
5				grain size, moist, marsh 3.5-5.0 light brown fine to medium sand. Moist = 3.1 massive, uniform grain size	SP		
	Run #2 5-10	5.0	1305	5-8 Brown to light brown fine to medium sand PID=0.8			
				moist, uniform grain size, no unusual odors or staining observed.	SP		
	OC-SB-436-6.0/8.0-XXX		1310			Yes	
				8-10 Olive to olive brown fine to coarse sand =0.2			
				and gravel, Wet, massive, wide range of grain size. =0.7	SW		
10		4.4		PID =0.1			
	Run #3 10-15	~~4.4~~	1310	10-15 Brown to yellowish brown fine to PID=0.5 coarse sand and gravel with traces of silt and cobbles. Moist, wide range of grain size	SW/GW		
				Interspersed with layers of light grey =0.4			
				to grey fine to coarse sand and gravel with silty material that looks like rock flour =0.2			
	OC-SB-436-13/15-XXX		1325	or pulverized concrete		Yes	
15				slight "metallic" odor. PID =0.8			

Notes

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Jenny Rawcliffe

Boring: SB-436

MACTEC

Project: Olin Chemical Superfund Site	Boring: SB-436
Location: Wilmington, MA	File No.:
Client: Olin	

		Definitions:
Contractor: Boart Longyear	Drilling Method: Rotosonic	S = Split Spoon Sample
Operator: Dale Drscher	Bore Hole ID/OD: 4 7/8 / 6"	U = Thin Wall Tube Sample
Logged By: Jerry Rawcliffe	Auger ID/OD: NA	R = Rock Core Sample
Checked By: C. Marzini	Sampler: Dave Chapman	V = Insitu Vane Shear Test
Date Start/Finish: 8/20/09	Hammer Wt./ Fall: NA	q_u = Unconfined Compressive Strength (psf)
Boring Location: Area 5	Water Level[3]: 10' in borehole 8' based on soils.	woh = weight of 140 lb. hammer
Ref. Elevation[1]:		wor = weight of rods
		wc = Water Content, percent
		oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	RUN #3 15-16.5	1.4	1330	Encountered possible top of bedrock at 15-15.3' BGS 15-15.5 Olive to olive gray cobbles with fine to coarse sand and a little silt. PID=0.5 15.5-16.5 Gray to light gray cobbles and gravel (JR) in what appears to be pulverized rock. Estimated top of rock at 15.3 Bottom of boring = ~~16.0~~ 16.5 BGS (JR)			
20							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin.

Boring: SB-437
File No.:

Contractor: Boart Longyear
Operator: Dave Drechsler
Logged By: Jerry Rauchfle
Checked By: C. Mazzolini
Date Start/Finish: 8/21/09
Boring Location: Area 4
Ref. Elevation[1]:

Drilling Method: Rotosonic
Bore Hole ID/OD: 4 7/8/6"
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 9' measured in borehole
7' BGS based on soil observation

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1	3.9	1225	0-0.6 Concrete PID=1.0			
	OC-SB-437-0/1.0-XXX		1230	0-1.5 Dark olive brown to dark brown fine to medium sand with a little coarse sand and gravel. Moist, =1.2		Y	
				1.5-2 Very dark brown to black fine to medium sand with traces of coarse sand =1.1			
				2-3 Brown fine to medium sand. Moist, massive uniform	SP		
				3-3.4 Very dark brown fine to medium sand.			
5				3.4-5 Brown to yellowish brown fine to medium sand moist. =1.0	SP		
	RUN #2 5-10	4.0	1230	5-7 Brown to yellowish brown fine to medium PID=1.5 sand. Very moist, some indistinct layering. Uniform	SP		
	OC-SB-437-5/7-XXX		1240	7-10 Brown to light brown fine to medium sand with some thin (0.1-0.2') layers of fine to coarse sand with slight yellowish color. =1.1		Ye	
				Wet, relatively uniform grain size. No unusual odors detected. =1.2			
10				=1.0	SP		
	Run #3 10-15	4.6	1240	10-12 Brown to light brown fine to medium sand PID: 1.5 with a trace of coarse sand. Wet.			
				12-14 Brown to light brown fine to medium sand with a little coarse sand and gravel. Wet with occasional yellowish colored layer. =1.1 =1.2			
				14-15 Brown to olive brown fine to coarse sand and gravel. Wet, massive =1.3	~~GW~~ ~~GR~~ GW		
15				=1.1			

Notes

A4-P4

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rauchfle

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-437
File No.:

Contractor: Boart Longyear	Drilling Method: Rotosonic
Operator: Dale Dischler	Bore Hole ID/OD: 4 7/8 / 6"
Logged By: Jerry Rawcliffe	Auger ID/OD: NA
Checked By: C. Mazzolini	Sampler: Dave Chapman
Date Start/Finish: 8/21/09	Hammer Wt./ Fall: NA
Boring Location: Area 4	Water Level[3]: 9' measured in boring
Ref. Elevation[1]:	7' based on soil observations

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	RUN #4 15-20	4.1	1250	15-17 Brown to olive brown fine to coarse sand and gravel and traces of small cobbles PID = 1.3 ppm	SW/GW		
				17-19 Olive brown fine sand with some silt and a little medium sand and traces of coarse sand and gravel along coarse grained layers. Wet. = 1.2 ppm = 1.5 ppm			
20				19-20 Brown to olive brown gravel with medium to coarse sand and a little fine sand. Wet. No unusual odors or staining observed. = 1.1 ppm = 1.3 ppm	GW		
	RUN #5 20-25	4.5	1300	20-21.5 Brown to olive brown fine to coarse sand and gravel. wet, massive. PID = 1.6 ppm	GW/GW	Yes	
	DC-SB-437-21/23-XXX		1310	21.5-23 Brown to olive to olive brown fine to coarse sand and gravel with some to a little silt. Wet, massive = 1.4			
		XX	XX	23-23.5 Olive to olive grey fine to medium sand with silt, gravel, coarse sand and traces of cobbles. = 1.2 ppm	XX		
				23.5-25 Encountered hard material - cobbles and gravel in very light grey pulverized rock. (rock flour + fine to medium-coarse grained material) = 1.5 ppm			
				Estimate top of bedrock at 23.5' BGS			
				Bottom of boring = 25' BGS.			

Notes

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Jerry Rawcliffe

Boring: SB-437

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-438
File No.:

Contractor: Boart Longyear
Operator: Dale Duschatt
Logged By: Terry Ramcliffe
Checked By: CM
Date Start/Finish: 8/24/09
Boring Location: Area 4
Ref. Elevation[1]:

Drilling Method: Roto Sonic.
Bore Hole ID/OD: 4 7/8 / 6"
Auger ID/OD: NA
Sampler: Dave Chipman
Hammer Wt./ Fall: NA
Water Level[3]: 9.5' measured in casing
7-8' Buschen soils.

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Runth 0-5	3.9	1640	0-0.5' Concrete PID = 48 ppm			
	OC-SB-438-0/10-XXA		1645	0-1.5 Brown fine to medium sand with a little coarse sand and gravel. Moist, massive	SP	Yes	
				1.5-2 Brown to light brown fine to medium sand. Moist. =52			
				2-2.5 Very dark brown to black fine to medium sand with a trace of silt. No unusual odors. =46	SP		
5				2.5-5.0 Brown fine to medium sand with a little silt. Moist, massive =44			
	Run #2 5-10	4.9	1645	5-7 Brown fine to medium sand with traces of coarse sand and silt. Very moist, some reddish orange (iron) staining with a thick layer of staining at bottom of interval (6.5-7'). PID = 33 =25	SP		
	OC-SB-438-5/7-XXA		1650	7-8.2 Light brown to brownish gray fine to medium sand with traces of coarse sand, Wet, =17		Yes	
				8.2-10 Brown fine to medium sand with traces of coarse sand along some layers. Slight reddish stained layers at (8.2'-8.3'). Wet, quite uniform grain size. No unusual odors detected. =25 =31	SP		
10							
	Run #3 10-15	4.4	1650	10-12.8 Olive gray to brown fine to medium sand and gravel with some cobbles and traces of coarse sand and silt. Wet, massive PID = 25 ppm =15 No unusual odors	GW		
				12.8-15 Olive to olive brown fine to coarse sand with some gravel and silt. Wet, massive. =28 =31 =43 ppm	GW/GM		
15							

Notes Dark layer 2-2.5 appears to contain organics but no recognizable debris such twigs Leaves slight staining of gloves, no unusual odors detected.

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Terry Ramcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-438
File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic	**Definitions:**	
Operator: Dale Dysdat	Bore Hole ID/OD: 4 7/8"/6"	S = Split Spoon Sample	
Logged By: Jerry Rawcliffe	Auger ID/OD: NA	U = Thin Wall Tube Sample	
Checked By: CTM	Sampler: Dave Chapman	R = Rock Core Sample	
Date Start/Finish: 8/24/09	Hammer Wt./ Fall: NA	V = Insitu Vane Shear Test	
Boring Location: Area 4	Water Level[3]: 9.5' Measured in casing	q_p = Unconfined Compressive Strength (psf)	
Ref. Elevation[1]:	7-8' Based on soils	weh = weight of 140 lb. hammer	
		wor = weight of rods	
		wc = Water Content, percent	
		oc = Organic Content, percen	

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	4.9	1700	15-16 Olive to olive brown fine to coarse sand with some gravel and silt. Wet, massive. PID = 42	SW/GW		
				16-17 Olive to olive brown fine to coarse sand and gravel with cobbles and some to a little silt = 37			
				17-18.5 Gray to light gray fine to coarse sand = 49			
				and gravel and pulverized cobbles/rock flour. Dry, wide range of grain size.	GW		
				18.5-20 Olive to olive brown fine to coarse sand and gravel with a little silt. Moist/wet/saturated. = 28			
20				= 41	GW		
	Run #5 20-22.5	2.5	1715	20-21.5 Olive to dark olive brown fine to coarse sand and gravel with cobbles. Wet, massive. Slight "metallic" odor PID = 4.5 = 6.2	GW		
	OL-SB-438-20/22-X-N		1720	21.5-22.5 Cobbles, gravel, fine to coarse sand and pulverized rock (rock flour) Moist. = 18 = 30		Yes	
				Encountered likely top of weathered rock at 21.0' BGS			
25				Poor rock from 21.5-22.5.			
				Bottom of boring = 22.5' BGS.			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Boring: SB-438

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-438**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/24/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 9.5' bgs measured in casing**
Ref. Elevation:	**7 - 8' bgs based on soils**

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	3.9	1640	0-0.5' Concrete				
	OC-SB-438-0/1.0-XXX		1645	0-1.5' Brown fine to medium sand with a little coarse sand and gravel . Moist, massive.	48	SP	YES	
				1.5-2' Brown to light brown fine to medium sand . Moist.	52			
5				2-2.5' Very dark brown to black fine to medium sand with a trace of silt. No unusual odors.	46	SP		
				2.5-5' Brown fine to medium sand with a little silt. Moist,	44			
	Run #2 5 - 10	4.9	1645	5-7' Brown fine to medium sand with traces of coarse sand and silt. Very moist, some reddish/orange (iron?) staining with a thick layer of staining at bottom of interval (6.9-7').	33	SP	YES	
	OC-SB-438-5/7-XXX		1650	7-8.2' Light brown to brownish gray fine to medium sand with traces of coarse sand. Wet.	25			
10				8.2-10' Brown fine to medium sand with traces of coarse sand along some layers. Slight reddish stained layer at (~8.2-8.3'). Wet, quite uniform grain size. No unusual odors detected.	17	SP		
					25			
					31			
	Run #3 10 - 15	4.4	1650	10-12.8' Olive gray to brown fine to medium sand and gravel with some cobbles and traces of coarse sand. Wet, massive. No unusual odors.	25	GW		
					15			
15				12.8-15' Olive to olive brown fine to coarse sand with some gravel and silt. Wet, massive.	28			
					31	GW/GM		
					43			

Notes

Dark layer 2-2.5' bgs appears to contain organics but no recognizable debris such as twigs or leaves. Slight staining of gloves, no unusual odors detected.

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-438**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/24/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 9.5' bgs measured in casing**
Ref. Elevation:	**7 - 8' bgs based on soils**

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	4.9	1700	15-16' Olive to olive brown fine to coarse sand with some gravel and silt. Wet, massive.	42	SW/GW		
				16-17' Olive to olive brown fine to coarse sand and gravel with cobbles and some to a little silt. Moist, massive.	37			
				17-18.5' Gray to light gray fine to coarse sand and gravel and pulverized cobbles/rock flour. Wide range of grain size.	49	GW		
					28	GW		
20				18.5-20' Olive to olive brown fine to coarse sand and gravel with a little silt. Moist, massive.	41			
	Run #5 20 - 22.5	2.5	1715	20-21.5' Olive to dark olive brown fine to coarse sand and gravel with a little silt. Wet, massive. Slight "metallic" odor.	4.5	GW		
	OC-SB-438-20/22-XXX		1720		6.2		YES	
				21.5-22.5' Cobbles, gravel, fine to coarse sand and pulverized rock (rock flour). Moist.	18			
					36			
				Encountered likely top of weathered rock at 21.0' bgs. Firm rock from 21.5-22.5' bgs				
25				Bottom of boring = 22.5' bgs.				

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: **SB-438**

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington MA
Client: Olin

Boring: SB-439
File No.:

Contractor: Boart Longyear	Drilling Method: Rotosonic
Operator: Duke Dischler	Bore Hole ID/OD: Inner casing 4"/6" OD / Outer casing 6" OD
Logged By: Terry Rawcliffe	Auger ID/OD: NA
Checked By: CTM	Sampler: Dave Chapman
Date Start/Finish: 5/24/09	Hammer Wt./ Fall: NA
Boring Location: Area 4	Water Level[3]: 9.3' measuring in borehole w casing
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
wgh = weight of 140 lb. hammer
wgr = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1	4.4	0940	0-0.5 Dark brown to dark reddish brown fine to medium sand with a little coarse sand and traces of gravel and silt. Some concrete fragments and a piece of lead pipe PID=0 =0			
	OC-SB-439-0/1.0-XX		0945	0.5-2.5 Dark Brown to very dark brown fine to medium sand with traces of silt. Moist to very moist slight layered appearance. Uniform grain size. =0	SP		
5				2.5-5.0 Brown to dark brown fine to medium sand. moist. =0 =0			
	Run #2 5-10	5.0	0945	5-6 Brown fine to medium sand. Very moist slight layered appearance, some orange colored (iron) staining: PID=1.0 =0.1	SP		
				6-8.5 Similar to above but light brown to light grayish brown. Very moist to wet.			
				8.5-10 Brown to light brown fine to medium sand with traces of coarse sand in some areas/layers =0	SP		
	OC-SB-439-8/10-XX		0950	Very moist to wet. =0			
10				No mussel odors detected.			
	Run #3 10-15	4.9	0955	10-11 Similar to 8.5-10' (uniform grain size). PID=0	SP		
				11-12.2 Brown to olive brown fine to medium sand with some gravel and a little coarse sand. Very moist to wet. =0.2			
				12.2-12.5 Light yellowish brown fine to coarse sand and gravel layer. =0			
				12.5-15 Olive brown to olive fine to coarse sand and gravel with some to a little silt and traces of cobbles. =0.1 Very moist, massive, wide range of grain size =0	GW/GM		
15							

Notes
A4-P6

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Terry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-439
File No.:

Contractor: Boart Longyear
Operator: Dale Duschatt
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 8/24/09
Boring Location: Area 4
Ref. Elevation[1]:

Drilling Method: Rotosonic
Bore Hole ID/OD: 4 7/8" inner casing ID/6" outer casing OD.
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 9.3' measured in borehole casing

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	4.6	1000	15-17 Olive to olive brown fine to coarse sand and gravel with a little silt. Wet, massive, wide range of grain size. PID=0.2	SW/GW		
				17-18 Brown to light yellowish brown fine to coarse sand with traces of silt and coarse sand. =0.7	SP		
	OU-SB-439-1618-XX		1040	Very moist to wet. PID=4.3			
20				18-20 Grey to olive grey gravel with some fine to coarse sand and cobbles with traces of silt. Moist, dry, massive. =2.6 =0.2	GW		
	Run #5 20-24	3.1	1025	20-22 Very light olive to light olive grey fine to coarse sand and gravel with silt and some cobbles, Wet, massive. PID: 0.7 =1.4	GW/GW		
				22-24 Very light grey gravel and cobble sized rock fragments in rock flour.			
25				Saturated encountering weathered boulders or bedrock at 19.5-20' BGS. Refusal encountered at ≈ 22' - Top of bedrock at 22' BGS. Bottom of boring = 24' BGS.			
30							

Notes

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Jerry Rawcliffe

Boring: SB-439

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-439**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/24/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 9.3' bgs measured in borehole w/casing**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	4.4	940	0-0.5' Dark brown to dark reddish brown fine to medium sand with a little coarse sand and traces of gravel and silt. Some concrete fragments and a piece of lead pipe Moist, massive.	0			
	OC-SB-439-0/1.0-XXX		945		0		YES	
						SP		
				0.5-2.8' Dark brown to very dark brown fine to medium sand with traces of silt. Moist to very moist, slight layered appearance. Uniform grain size.	0			
5				2.8-5' Brown to dark brown fine to medium sand . Moist.	0			
	Run #2 5 - 10	5.0	945	5-6' Brown fine to medium sand. Very moist, slight layered appearance, some orange colored (iron) staining.	1			
						SP		
				6-8.5' Similar to above but light brown to light grayish brown . Very moist to wet.	0.1			
				8.5-10' Brown to light brown fine to medium sand with traces of coarse sand in some areas/layers. Very moist to wet.	0			
	OC-SB-439-8/10-XXX		950		0.2	SP	YES	
				No unusual odors detected.				
10					0			
	Run #3 10 - 15	4.9	955		0			
				10-11' Similar to 8.5-10' (uniform grain size)		SP		
				11-12.2' Brown to olive brown fine to medium sand with some gravel and a little coarse sand. Very moist to wet.	0.2			
				12.5-15' Olive brown to olive fine to coarse sand and gravel with some to a little silt and traces of cobbles. Very moist, massive, wide range of grain sizes.	0			
					0.1	GW/GM		
15					0			

Notes
A4-P6

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: **SB-439**

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-439**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/24/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 9.3' bgs measured in borehole w/casing**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	4.6	1000	15-17' Olive to olive brown fine to coarse sand and gravel with a little silt. Wet, massive, wide range of grain size.	0.2	SW/GW		
					0.7			
	OC-SB-439-16/18-XXX		1040	17-18' Brown to light yellowish brown fine to medium sand with traces of silt and coarse sand. Very moist to wet.	4.3	SP	YES	
					2.6			
20				18-20' Gray to Olive gray gravel with some fine to coarse sand and cobbles with traces of silt. Moist to dry, massive.	0.2	GW		
	Run #5 20 - 24	3.1	1025	20-22' Very light olive to light olive gray fine to coarse sand and gravel with silt and some cobbles. Wet, massive.	0.7	GW/GM		
				22-24' Very light gray gravel and cobble sized rock fragments in rock flour.	1.4			
				Started encountering weathered boulders or bedrock at 19.5 - 20' bgs. Rock became firm at ~22' - Top of hard bedrock at 22' bgs. Bottom of boring = 24' bgs.				
25								

Notes

Jerry K. Rawcliffe

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MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington V
Client: Olin

Boring: SB-440
File No.:

Contractor: Boart Longyear
Operator: Duke Drilling
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 8/24/09 (MON)
Boring Location: Area 4
Ref. Elevation[1]:

Drilling Method: Rotosonic
Bore Hole ID/OD: 4 7/8" OD inner casing / 6" OD outer casing
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 7-8' BGS based on soil observations

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wwh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1	4.5	1135	0-0.5 Dark brown to brown fine sand and silt with some to a little medium to coarse sand and gravel. Wet to very moist, root fibers (Topsoil) PID=1.7			
	OC-SB-440-0/4.0-XXX		1140	0.5-2.7 Brown fine to medium sand with some coarse sand and gravel. Dry to moist, moderate =0	SP/SW		
				moderately wide range of grain size. (Fill)			
				2.7-5.0 No unusual odors detected. Brown to dark brown fine to medium =0			
5				sand with a little gravel and coarse sand. Moist to very moist, black gravel size fragments that appear =0			
	Run #2 5-10	2.9	1140	to be old asphalt.			
				5-6.5 Brown to dark brown fine to medium sand PID=0	SP/SW		
				with some gravel and a little to trace of coarse sand and silt. Moist, moderate.			
				6.5-8 Brown to light brown fine to medium PID=			
				sand with some root fibers and a couple thin layers			
	OC-SB-440-4/6-XXX		1150	of very dark brown (organics?) fine sandy material. PID=0			
				8-10 Brown fine to medium sand with some orange			
			1150	stained (iron?) layers. Little gravel and trace of	SP		
10				coarse sand cobbles. Well, relatively uniform grain size PID=0			
	Run #3 10-15	4.5	~~1155~~	10-11 Brown fine to medium sand with a trace PID=0.4			
				of silt and gravel. Very moist			
				11-13.5 Dark olive gray to dark gray to light gray			
				fine to medium sand and silt with cobbles and coarse =6.2	GW/		
				sand and gravel. Very moist to dry. Drilling			
				through cobbles made soils hot to touch			
				and PID readings were elevated. =1.7			
				13.5-15 Brown to olive brown fine to medium sand			
15				with some coarse sand and silt and a little gravel =0.9			
				trace of cobbles. Very moist. moderate			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Boring: SB-440

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-440
File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic.
Operator: Dale Dyche	Bore Hole ID/OD: 4 7/8 / 6"
Logged By: Jerry Rawcliffe	Auger ID/OD: N/A
Checked By: CIM	Sampler: Dave Chapman
Date Start/Finish: 8/24/09	Hammer Wt./ Fall: N/A
Boring Location: Area 4	Water Level[3]: 7-8' Based on soil observations
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
weh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	4.4	1200	15-17.5' Olive to olive brown fine to coarse sand and gravel with traces of silt and cobbles. Very moist, massive. PID=0.4 =0.7	GW		
				17.5-18.5 Yellowish olive brown fine to coarse sand and gravel with little to traces of silt and cobbles. Very moist. =2.8	GW/GM		
20				18.5-20 Olive to olive gray fine to coarse sand and gravel with cobbles and a little silt. Very moist, massive. Paint "metallic" odor. =1.4 =5.5			
	Run #5 20-25	4.5	1200	20-22 Olive to olive brown fine to coarse sand and gravel with a little silt and traces of cobbles. Wet, massive PID=2.8 =1.8			
				22-24.5 light olive brown fine to coarse sand with some silt and gravel and traces of cobbles Very moist to wet massive. =5.4			
	DC-SB-440-23/25-001		1230	24.5-25 Light brown to light olive brown fine to coarse sand and gravel with a little silt and cobbles - Moist, massive. =8.6 =7.4	GW/GM		
25							
	Run #6 25-27	2.4	1230	25-26 light olive brown to light olive gray fine to coarse sand and gravel with cobble and a little silt. Very moist to wet, massive. PID=0.6 =0.9	GW/GM		
				26-27 light gray gravel and cobble sized rock fragments in pulverized rock flour.			
				Estimated top of rock = 26' BGS			
				Bottom of boring = 27' BGS			

Notes 26 - 27

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Boring: SB-440

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-440**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/24/2009 MON	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 7-8' bgs based on soil observations**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	4.5	1135	0-0.5' Dark brown to brown fine sand and silt with some to a little medium to coarse sand and gravel. Wet to very moist, root fibers (Topsoil).	1.7		YES	
	OC-SB-440-0/1.0-XXX		1140	0.5-2.7' Brown fine to medium sand with some coarse sand and gravel. Dry to moist, massive . Moderately wide range of grain sizes. (Fill)	0.2	SP/SW		
				No unusual odors detected.	0			
				2.7-5' Brown to dark brown fine to medium sand with a little gravel and coarse sand. Moist to very moist, black gravel sized fragments that appear to be old asphalt..	0			
5					0			
	Run #2 5 - 10	2.9	1140	5-6.5' Brown to dark brown fine to medium sand with some gravel and a little to traces of coarse sand and silt. Moist, massive.	1	SP/SW		
				6.5-8' Brown to light brown fine to medium sand with some root fibers and a couple thin layers of very dark brown (organics?) fine sandy material.	0			
					0			
	OC-SB-440-6/8-XXX		1140	8-10' Brown fine to medium sand with some orange stained (iron?) layers, little gravel and traces of coarse sand and cobbles. Wet, relatively uniform grain size..	0	SP	YES	
10				No unusual odors detected.	0			
	Run #3 10 - 15	4.5	1150	10-11' Brown fine to medium sand with a trace of silt and gravel. Very moist.	0.4			
				11-13.5' Dark olive gray to dark gray to light gray fine to medium sand and silt with cobbles and coarse sand and gravel. Very moist to dry. Drilling through this area with cobbles makes the soils hot to the touch and PID readings were elevated.	6.2	GW/GM		
					1.7			
				13.5-15' Brown to olive brown fine to medium sand with some coarse sand and silt and a little gravel and traces of cobbles. Very moist, massive.	0.9			
15								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: **SB-440**

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-440**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/24/2009 MON	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 7-8' bgs based on soil observations**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	4.4	1200	15-17.5' Olive to olive brown fine to coarse sand and gravel with traces of silt and cobbles. Very moist, massive.	0.4	GW		
				17.5-18.5' Yellowish olive brown fine to coarse sand and gravel with traces of silt and cobbles. Very moist.	0.7			
					2.8		YES	
				18.5-20' Olive to olive gray fine to coarse sand and gravel with cobbles and a little silt. Very moist, massive. Faint "metallic" odor.	1.4	GW/GM		
20					5.5			
	Run #5 20 - 25	4.5	1220	20-22' Olive to olive brown fine to coarse sand and gravel with a little silt and traces of cobbles. Wet, massive.	2.8			
				22-24.5' Light olive brown fine to coarse sand with some silt and gravel and traces of cobbles. Very moist to wet, massive.	1.8	GW/GM		
				24'.5-25' Light brown to light olive brown fine to coarse sand and gravel with a little silt and cobbles. Moist, massive.	5.4			
	OC-SB-440-23/25-XXX		1230		8.6		YES	
25					7.4			
	Run #6 25 - 27	2.4	1230	25-26' Light olive brown to light olive gray fine to coarse sand and gravel with cobbles and a little silt. Very moist to wet, massive.	0.6	GW/GM		
					0.9			
				26 -27' Light gray gravel and cobble sized rock fragments in pulverized rock flour.				
				Estimated top of rock = 26' bgs				
				Bottom of boring = 27' bgs				

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client:

Boring: SB-441
File No.:

Contractor: Boart Longyear
Operator: Dale Dyschet
Logged By: Jerry Rowcliffe
Checked By: CTM
Date Start/Finish: 8/24/09
Boring Location: Area 4
Ref. Elevation[1]:

Drilling Method: Roto sonic
Bore Hole ID/OD: 4" inner casing OD/6" outer casing OD.
Auger ID/OD: N/A
Sampler: Dave Chapman
Hammer Wt./ Fall: N/A
Water Level[3]: 7-8' BGS based on soil observations

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	3.9	1445	0-1.0 Brown to dark brown fine to medium sand with silt and some coarse sand and gravel. Dry to moist, roots/fibers near surface. (Topsoil). PID = 14	SW	Yes	
	QC-SB-441-0/10-xxx		1450	1-2.4 - light brown fine to medium sand with a little coarse sand and gravel. Moist, massive. = 27	SP/SW		
5				2.4-3 Dark brown fine sand with a little medium sand and silt. Bottom of interval has a layer of organic material very dark brown, moist. = 4.9 3-5 Brown fine to medium sand with a little silt and traces of cobbles. No unusual odors. = 6.2 = 15	SP SP		
	Run #2 5-10	5.1	1450 (1455)	5-6.8 Brown to light brown fine to medium sand with some reddish orange (iron) staining. Very moist. Uniform grain size. PID = 33 = 24	SP		
				6.8-7.7 light brown to light grayish brown fine to medium sand with a trace of silt. Very moist to wet.	SP		
10	QC-SB-441-8/10-xxx		1455	7.7-10 Brown fine to medium sand with some reddish orange stained layers. Traces of coarse sand along some layers. Wet, stratified appearance uniform grain size, no unusual odors. = 14 = 25 = 48	SP		
	Run #3 10-15	4.0	1505	10-13 Dark olive brown to dark olive gray fine to coarse sand and gravel with some cobbles. Wet, massive, wide range of grain size. PID = 20 = 0	SW/GW		
15				13-15 light olive brown fine to coarse sand with silt and a little gravel. Wet, massive. = 0 = 0	GW/GW		

Notes

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Jerry Rowcliffe

Boring: SB-441

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-441
File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic
Operator: Dale Dyzelbar	Bore Hole ID/OD: 4 7/8 inner casing OD/6" outer casing OD
Logged By: Jenny Rawcliffe	Auger ID/OD: NA
Checked By: CTM	Sampler: Dave Chapman
Date Start/Finish: 8/24/09	Hammer Wt./ Fall: NA
Boring Location: Area 4	Water Level[3]: 7-8' BGS based on soil observations
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	4.8	1510	15-17.5 Olive to dark olive brown fine to coarse sand and gravel with a trace of silt and cobbles. Wet, massive. Dark stained layer at bottom of interval (17.5'). PID = 12	GW		
				= 4			
				17.5-18.3 Brown to olive brown fine to coarse sand and gravel with some cobbles and a little silt. Very moist to wet. = 2	GW/GM	Yes	
	OE-SB-441-17/19-xxxx		1535				
				18.3-18.5 light gray to white fine to medium sand and gravel (broken up cobble layer?). Dry. = 4	GW		
20				18.5-20 Olive to dark brown fine to medium sand and silt with a little coarse sand and gravel. Moist, massive = 10			
	Run #5 20-23	2.5	1530	Estimate top of weathered rock = 20.5' BGS Recovered a combination of pieces of cobble/bedrock in pulverized rock flour.			
		XXX		Encountered firm rock at 23' BGS			
25				Bottom of boring = 23' BGS			

Notes

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Jenny Rawcliffe

Boring: SB-441

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-441**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/24/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 7-8' bgs based on soil observations**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	3.9	1445	0-1.0' Brown to dark brown fine to medium sand with silt and some coarse sand and gravel. Dry to moist, root fibers near surface. (Topsoil).	1.7	SW	YES	
	OC-SB-441-0/1.0-XXX		1450	1-2.4' Light brown fine to medium sand with a little coarse sand and gravel. Moist, massive.	0.2	SP/SW		
				2.4-3' Dark brown fine sand with a little medium sand and silt. Bottom of interval has a layer of organic material very dark brown, moist.	0			
				3-5' Brown fine to medium sand with a little silt and traces of cobbles. No unusual odors.	0	SP		
5					0			
	Run #2 5 - 10	5.1	1450	5-6.8' Brown to light brown fine to medium sand with some reddish orange (iron) staining. Very moist, uniform grain size.	1	SP		
				6.8-7.7' Light brown to light grayish brown fine to medium sand with a trace of silt. Very moist to wet.	0			
				7.7-10' Brown fine to medium sand with some reddish orange stained layers. Wet, stratified appearance, uniform grain size.	0			
				No unusual odors.	0	SP		
	OC-SB-441-8/10-XXX		1455				YES	
10					0			
	Run #3 10 - 15	4.0	1505	10-13' Dark olive brown to dark olive gray fine to coarse sand and gravel with some cobbles. Wet, massive, wide range of grain sizes.	0.4	SW/GW		
					6.2			
				13-15' Light olive brown fine to coarse sand with silt and a little gravel. Wet, massive.	1.7	GM/GW		
					0.9			
15								

Notes

Jerry K. Rawcliffe

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MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-441**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/24/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 7-8' bgs based on soil observations**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	4.8	1510	15-17.5' Olive to dark olive brown fine to coarse sand and gravel with a trace of silt and cobbles. Wet, massive. Dark stained layer at bottom of interval (17.5")	12	GW		
				17.5-18.3' Brown to olive brown fine to coarse sand and gravel with some cobbles and a little silt. Very moist, to wet.	9			
	OC-SB-441-17/19-XXX		1535		2		YES	
				18.3-18.9' Light gray to white fine to medium sand and gravel (broken up cobble layer?). Dry.		GW/GM		
				18.9-20' Olive to olive brown fine to medium sand and silt with a little coarse sand and gravel. Moist, massive.	4	GM		
20					10			
	Run #5 20 - 23	2.5	1530	Estimate top of weathered rock = 20.5' bgs. Recovery consisted of pieces of cobble/bedrock in pulverized rock flour. Encountered firm rock at 22' bgs. Bottom of boring = 23' bgs				
25								

Notes

Jerry K. Rawcliffe

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MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client:

Boring: SB-442
File No.:

Contractor: Boart longyear	Drilling Method: Roto Sonic
Operator: Greg Halliday	Bore Hole ID/OD: 6" OD
Logged By: Terry Rawcliffe	Auger ID/OD: 4"/8.00 inner casing/6" OD outer casing
Checked By:	Sampler: Marc Macrocore
Date Start/Finish: 8/31/09	Hammer Wt./ Fall: NA
Boring Location: Area 4	Water Level[3]: 8.7' Measured in borehole w/ casing BGS 6-7' BGS Based on soils.
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	4.2	1150	0-1.5 Dark brown to light brown to black PID=0.1 to dark reddish brown. Fine to medium sand with some coarse sand and gravel. Moist stratified with different colored layers 0.1-0.5' thick. =0			
	OC-SB-442-0/1.0-XXX		1200	1.5-2 Brown fine to medium sand moist.	SP	Yes	
				2-2.5 Black to very dark brown fine sand and organic debris - very fine/well decomposed. =0			
5	Run #2 5-10	4.9	1200	2.5-5 Brown to light brown fine to medium sand with a trace of silt. Very moist. No unusual odors. =0.4			
				5-8 Brown to light brown fine to medium sand PID=0.2 with traces of coarse sand. Very moist to wet.	SP		
				8-10 light brown fine to medium sand =0.4 with a trace of silt. Wet, stratified with			
				some thin (1-3 mm) fine grained layers. =0.4 No unusual odors.			
				=0.5	SP		
	OC-SB-442-8/10-XXX		1210	=0.4		Yes	
10		DUP/XMS/MSD					
	Run #3 10-15	4.0	1210	10-11.5 Brown to light brown fine to medium sand grading to fine to medium sand with a little coarse sand and gravel. Wet. some sand stratification with gravelly layers. PID=0.1 =0.4	SP/SW		
				11.5-15 Brown to olive brown fine to coarse sand =0.5 with some gravel and a little cobbles and silt. Very moist to wet with a couple reddish brown "iron" =0.2 stained areas.			
15				=0.1	GW		

Notes

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Terry Rawcliffe

Boring: SB-442

MACTEC

Project: Olin Chemical Superfund
Location: Wilmington,
Client:

Boring: SB-442
File No.:

Contractor: Boart longyear
Operator: Greg Halliday
Logged By: Jerry Rawcliffe
Checked By: JTR
Date Start/Finish: 8/31/09
Boring Location: Brenq
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4"/8" OD inner casing/6" OD outer casing
Sampler: Marc Massione
Hammer Wt./ Fall: NA
Water Level[3]: 8.7' BGS measured in borehole
6-7' BGS based on sights -

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wsh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	RUN#4 15-20	3.1	1250	15-17.5 Olive to olive brown fine to coarse sand, with some gravel and a trace of silt. Wet, very disturbed/no visible structure. PID=0.3 =0.1	SP/SW		
				17.5-20 Olive to olive brown Fine to coarse sand and gravel with a little cobbles and silt. Wet, massive. Faint ammonia-like odor. =0.2	GW/GM		
20				=0.2			
	RUN#5 20-24	4.2	1315	20-23 Olive to olive brown Fine to coarse sand and gravel with a little cobbles and lobe to traces of silt. Wet, becomes finer grained with depth PID=0.1 =0.2 Faint ammonia-like odor.	GW	Yes	
	~~OC-SB-442-20/22-GW~~		1320				
	~~OC-SB-442-20/22-GW~~		~~1320~~	23-24 Dark gray gravel and cobbles with fine to coarse sand and silt (wet with flour). =0 =0.1 Estimated top of rock = 23' BGS			
25				Bottom of boring = 24' BGS			
30							

Notes

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Jerry Rawcliffe

Boring: SB-442

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-442**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Mark Maggiore**
Date Start/Finish: 8/31/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 8.7' bgs measured in borehole with casing**
Ref. Elevation:	**6-7' bgs based on soils**

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	4.2	1150	0-1.5' Dark brown to light brown to black to dark reddish brown fine to medium sand with some coarse sand and gravel. Moist, stratified with different colored layers 0.1 to 0.5' thick.	0.1	SP	YES	
	OC-SB-442-0/1.0-XXX		1200	1.5-2' Brown fine to medium sand . Moist.	0			
				2-2.5' Black to very dark brown fine sand and organic debris very fine/well decomposed.	0			
				2.5-5' Brown to light brown fine to medium sand with a trace of silt. Very moist.	0.1	SP		
5				No unusual odors.	0.4			
	Run #2 5 - 10	4.9	1200	5-8' Brown to light brown fine to medium sand with traces of coarse sand. Very moist to wet.	1	SP		
					0			
				8-10' Light brown fine to medium sand with a trace of silt. Wet, stratified with some thin (1-3 mm) fine grained layers.	0			
					0	SP		
	OC-SB-442-8/10-XXX		1210	No unusual odors.			YES	
10	DUP/XMS/MSD				0			
	Run #3 10 - 15	4.0	1210	10-11.5' Brown to light brown fine to medium sand grading to fine to medium sand with a little coarse sand and gravel. Wet, some crude stratification with gravelly layers.	0.4	SP/SW		
					6.2			
				11.5-15' Brown to olive brown fine to coarse sand with some gravel and a little cobbles and silt. Very moist to wet, with a couple of reddish brown "iron" stained areas.	1.7	GW		
15					0.9			

Notes

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Boring: **SB-442**

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-442**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Mark Maggiore**
Date Start/Finish: 8/31/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 8.7' bgs measured in borehole with casing**
Ref. Elevation:	**6-7' bgs based on soils**

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	3.1	1250	15-17.5' Olive to olive brown fine to coarse sand with some gravel and a trace of silt. Wet, very disturbed, no visible structure.	12	SP/SW		
					9			
			1535	17.5-20' Olive to olive brown fine to coarse sand and gravel with a little cobbles and silt. Wet, massive.	2	GW/GM		
				Faint ammonia-like odor.	4			
20					10			
	Run #5 20 - 24	4.2	1315	20-23' Olive to olive brown fine to coarse sand and gravel with a little cobbles and a little to traces of silt. Wet, becomes finer grained with depth. Faint ammonia-like odor.		GW		
	OC-SB-442-20/22-XXX		1535	23-24' Dark gray gravel and cobbles with fine to coarse sand and silt (wet rock flour). Estimate top of rock = 23' bgs. Bottom of boring = 24' bgs			YES	
25								

Notes

Jerry K. Rawcliffe

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MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington MA
Client: Olin

Boring: SB-443
File No.:

Contractor: Boart Longyear	Drilling Method: Rotosonic
Operator: Dale Dyscher	Bore Hole ID/OD: 4 7/8" OD inner casing/6" OD Outer
Logged By: Jerry Rawcliffe	Auger ID/OD: NA
Checked By: C. Mazzeo	Sampler: Dave Chapman
Date Start/Finish: 8/20/09	Hammer Wt./ Fall: NA
Boring Location: Area 5	Water Level[3]: 9' measured with casing in borehole.
Ref. Elevation[1]:	7.5' Based on soil observations.

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	3.3	1630	0-0.6 Concrete PID=0.5			
	OC-SB-443-0/10-XXX		1635	0-4.5' Brown fine to medium sand with a little coarse sand and gravel. Moist, massive relatively uniform grain size No unusual odors. =0	SP	Yes	
5				4.5-5.0 light brown fine to medium sand. Moist, very uniform grain size. =0.3 =0.5	SP		
	Run #2 5-10'	4.2	1635	5-10' Brown to light brown fine to medium sand with a trace of coarse sand. Moist becoming very moist to wet at 7-8' bgs. PID=0.7 =0.5	SP		
	OC-SB-443-6/8-XXX		1640			Yes	
10			1645 (DB)	Slightly coarser grained at the bottom of the sample interval. No observed staining or unusual odors =0 -0.6	SP		
	Run #3 10-15	4.4	1640	10-12 light brown to light grayish brown fine to medium sand. Very moist, massive, very uniform grain size. PID=0.7 1 =0.5	SP		
15				12-15 light to dark gray to light olive brown fine to coarse sand and gravel with a little to trace of silt and cobbles very moist. massive. No unusual odors or staining detected. =0.3 =0.6	SW/GW		

Notes

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Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-443
File No.:

Contractor: Boart Longyear	Drilling Method: RotoSonic
Operator: Dale Dyschet	Bore Hole ID/OD: 4 7/8 / 6"
Logged By: Jerry Rawcliffe	Auger ID/OD: NA
Checked By: C. Mangold	Sampler: Dave Chapman
Date Start/Finish: 8/20/09	Hammer Wt./ Fall: NA
Boring Location: Area 5	Water Level[3]: 9' measured with casing in borehole.
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run # 4 15-20	4.8	1705	15-16.5 light olive grey to grey fine to coarse sand and gravel with a little silt and traces of cobbles. Very moist to wet. Wide range of grain size, massive. PID = 1.0 =0.6	SW/GW		
				16.5 - 20 Olive grey to yellowish brown fine to coarse sand and gravel with a little silt and cobbles. Very moist massive Yellow color maybe staining or weathering. Slight "metallic" odor. =0.7 =0.3	SW/GW		
20	OC-SB-443-18/20-0820		1720			Yes	
	Run #5 20-23	2.4	1715	20-21 Olive grey fine to coarse sand and gravel PID = 0.5 wet, massive.	SW/GW		
				21-22 Olive grey to pale yellowish olive fine to coarse sand and gravel with silt and cobbles. Wet. =0.7			
				22-22.5 Recovered a piece of granitic rock boulder			
			(22)	~~22.5~~ 22.5-23 Bedrock or possible boulder. =0.4			
25				Estimate top of bedrock at 22.5' BGS.			
				Bottom of boring = 23' BGS			

Notes

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Jerry Rawcliffe

Boring: SB-443

MACTEC	Project: Olin Chemical Superfund Site Location: Wilmingtan, MA Client: Olin	Boring: SB-444 File No.:

Contractor: Boart Longyear	Drilling Method: RotoSonic	**Definitions:** S = Split Spoon Sample U = Thin Wall Tube Sample R = Rock Core Sample V = Insitu Vane Shear Test q_u = Unconfined Compressive Strength (psf) woh = weight of 140 lb. hammer wor = weight of rods wc = Water Content, percent oc = Organic Content, percent
Operator: John Grulia	Bore Hole ID/OD: 4 7/8" OD inner casing / 6" OD outer casing	
Logged By: Jerry Rawcliffe	Auger ID/OD: NA	
Checked By: GTM	Sampler: Dave Chapman	
Date Start/Finish: 8/27/09	Hammer Wt./ Fall: NA	
Boring Location: Area 5	Water Level[3]: 10' and rising in borehole	
Ref. Elevation[1]:	Based on soils ~6' BGS	

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	3.9	1315	0-2' Asphalt PID=0.8			
	OC-SB-444-0/1.0-XXX		1320	0-0.9. Brown fine to coarse sand and gravel with a trace of silt. (Paving subgrade). Dry to moist. ≈0.2	SW		
				0.9-2.9 Dark brown to brown fine to medium sand with a trace of coarse sand. Moist, layered appearance with darker & lighter colored layers. ≈0.4	SP		
5				2.9-5 light brown to brown fine to medium sand with a little silt at the bottom of the interval ≈0.8 more fines and darker colored with depth. Moist to very moist. No unusual odors detected ≈0.7	SP		
	Run#2 5-10	5.2	1320	5-5.5 light brown to brown sand, Moist.	SP		
	OC-SB-444-5/7-XXX		1330	5.5-6 Brown to dark reddish fine to medium sand with a little [illegible] sand Very moist to wet. "metal odor" 2	SP		
10				6-8.1 Brown to dark brown fine to medium to a little coarse sand also some wet 2 8-10' Brown to olive brown gravel with a little to traces to little Wet, wide range of grain size	GW		
	Run#3 10-15	4.4	1325	10-11 Brown to dark brown fine coarse sand and gravel with little 11-12 light brown cobbles fine to coarse sand and silt 12-15 Brown to olive brown olive fine to	GW GW		
15	OC-SB-444-12/14-XXX		1400	coarse sand and gravel. Silty layer from ≈12.2 to 12.8 with a black stained 1/2" layer in the middle. Very moist. ≈0.2 ≈0.4	GW/GW GW	Yes	

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-444
File No.:

Contractor: Boart Longyear
Operator: John Coulia
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 8/27/09
Boring Location: Area 5
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 4 7/8" OD inner casing/6" OD overcasing
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 10' and rising in borehole
Based on soils = 6' BGS.

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wsh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	4.4	1350	15-16.5 Brown to olive brown fine to coarse sand and gravel with cobbles and a little silt 6" cobble at top of interval. Moist, massive. PID = 0.2	GW		
				16.5-19.5 Olive to olive brown to olive gray fine to coarse sand and gravel with some cobbles and some to a little silt. Very moist layered appearance with color changes over different areas. "Metallic" odor in some areas of sample. PID = 0.2	GW/GM		
20		1X	1M	Dark gray fine to coarse sand and gravel and cobbles with PID = 0.1			
	Run #5 19.5-20.5	1.6	1400	silt. Bottom is large rock fragments. Wet. PID = 0.2			
				Started getting very hard at 19.5' Estimate bedrock at 19.5-20' BGS			
				Bottom of boring = 20.5' BGS.			
25							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Boring: SB-444

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-444**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: John Gralia	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/24/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 5	**Water Level: 10' bgs and rising in borehole**
Ref. Elevation:	**Based on soils ~ 6' bgs**

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	3.9	1315	0-0.2' Asphalt 0-0.9' Brown fine to coarse sand and gravel with a trace of silt. (Paving Sub grade) Dry to moist. 0.9-2.9' Dark brown to brown fine to medium sand with a trace of coarse sand. Moist, layered appearance, with darker and lighter colored layers. 2.9-5' Light brown to brown fine to medium sand with a little silt at the bottom of the interval. More fines and darker colored with depth. Moist to very moist. No unusual odors.	0.8	SW	YES	
	OC-SB-444-0/1.0-XXX		1320		0.2	SP		
					0.4			
					0.8			
5					0.7	SP		
	Run #2 5 - 10	5.2	1320	5-5.5' Light brown to brown fine to medium sand. Moist. 5.5-6' Brown to dark reddish (iron stained) brown fine to medium sand with a little coarse sand. Very moist to wet, "metallic" odor, uniform grain size. 6-8' Brown to dark brown fine to medium sand with some to a little coarse sand along some layers. Wet. 8-10' Brown to olive brown fine to coarse sand and gravel with a little to traces of cobbles and silt. Wet, wide range of grain size..	1.2	SP	YES	
	OC-SB-444-5/7-XXX		1330		0.2			
					0.4	SP		
					0.2			
10					0.3	GW		
	Run #3 10 - 15	4.4	1325	10-11' Brown to dark brown fine to coarse sand and gravel with a little small cobbles. Wet. 11-12' Light brown cobbles and gravel with fine to coarse sand and silt. Wet. 12-15' Brown to olive brown to olive fine to coarse sand and gravel. Silty layer from 12.2 to 12.8 with a black stained 1/2" layer in the middle. Very moist.	0.8	GW		
					1.3			
	OC-SB-444-12/14-XXX		1400		0.4	GW	YES	
						GM/GW		
					0.2			
15					0.4	GW		

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-444**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: John Gralia	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/24/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 5	**Water Level: 10' bgs and rising in borehole**
Ref. Elevation:	**Based on soils ~ 6' bgs**

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 19.5	4.4	1350	15-16.5' Brown to olive brown fine to coarse sand and gravel with cobbles and a little silt. 6" cobble at top of interval, moist, massive.	0.2	SW/GW		
					0.2			
				16.5-19.5' Olive to olive brown to olive gray fine to coarse sand and gravel with some cobbles and some to a little silt. Very moist, layered appearance with color changes over different areas.		SP	YES	
					0.2			
20	Run #5 19.5 - 20.5	2	1400	"Metallic" odor in some areas of the sample	0.1	GW		
				Dark gray fine to coarse sand and gravel and cobbles with silt. Bottom is large rock fragments, wet. Started getting very hard at 19.5'. Estimate top of bedrock at 19.5-20' bgs. Bottom of boring = 20.5' bgs.	0.2	GW/GM		
25								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington MA
Client: Olin

Boring: SB-445
File No.:

Contractor: Boart longyear	Drilling Method: Rotosonic
Operator: Dale Dysbert	Bore Hole ID/OD: 4 7/8" ID Inner casing / 6" OD outer casing
Logged By: Jerry Rawcliffe	Auger ID/OD: NA
Checked By: C. Mazzeo/mc	Sampler: Dave Chapman
Date Start/Finish: 8/21/09	Hammer Wt./ Fall: NA
Boring Location: Area 4	Water Level[3]: 8.5 BGS Measured in borehole
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	4.0	0855	0-0.1 Asphalt. PID=0.5			
	OC-SB-445-0/1.0-XXX		0900	0.1-1 Brown fine to coarse sand and gravel with traces of cobbles. Moist.	GW	Y S	
				1-1.2 Gray fine to coarse sand and gravel - appears to be broken up concrete. =0.4	GW		
5				1.2-2 Brown to dark brown fine to coarse sand and gravel with strong and traces cobbles. =0.5			
				2-5 Dark brown fine to medium sand with traces of coarse sand and gravel and wheat (uniform appears to be areas with asphalt fragments Very moist =0 =1.	SP		
	Run#2 5-10	4.4	0900	5-7.5 Dark brown fine to medium sand. PID=0.8 Very moist, slight stratified appearance, uniform grain size. Some reddish brown areas (appears to be iron staining near bottom of interval =0.6			
				7.5-10 Alternating Brown and reddish brown (ironstained?)			
10				layers of fine to medium sand with traces of coarse sand. Very moist to wet, uniform grain size. =0.9 =0. =1.2 to olive brown	SP		
	OC-SB-445-8/10-XXX		0910				
	Run#3 10-15	4.8	0910	10-11.5 Brown fine to medium sand with traces of gravel. Very moist to wet, massive, uniform grain size. PID=1.1	SP		
				11.5-13.5 Brown to olive brown to reddish brown (ironstained?). fine to medium sand with traces of coarse sand and gravel and cobbles. becomes =1.2			
15				slightly silty near bottom of interval. =1.3			
				13.5-15 Brown to olive brown fine to coarse sand and gravel with traces of cobbles and silt. Very moist massive, wide range of grain size. No unusual odors detected. =1.6	GW		

Notes

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Jerry Rawcliffe

Boring: SB-445

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin.

Boring: SB-445
File No.:

Contractor: Boart Longyear	Drilling Method: Rotosonic	**Definitions:**
Operator: Dale Duschee	Bore Hole ID/OD: 4 7/8/6"	S = Split Spoon Sample
Logged By: J. Rawcliffe	Auger ID/OD: NA	U = Thin Wall Tube Sample
Checked By: C. Mazzolini	Sampler: Dave Chapman	R = Rock Core Sample
Date Start/Finish: 8/21/09	Hammer Wt./ Fall: NA	V = Insitu Vane Shear Test
Boring Location: Area 4	Water Level[3]: 8.5' BGS measured in borehole.	q_p = Unconfined Compressive Strength (psf)
Ref. Elevation[1]:		woh = weight of 140 lb. hammer
		wor = weight of rods
		wc = Water Content, percent
		oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification		Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	4.9	0925	15-17.7 Olive brown to olive gray fine to coarse sand and gravel with a little silt and cobbles. Very moist to wet.	PID=0.8	GW/GM		
				17.7-18 layers of light olive gray fine to coarse sand and gravel with a cobble and traces of silt.				
				18-20 Olive brown fine to coarse sand and gravel with a little silt and traces of cobbles. Very moist. Massive, wide range of grain sizes. Some very dark brown to black stained pockets at bottom of interval. No unusual odors.	=0.7 =0.9 =1.1	GW		
20								
	Run #5 20-25	3.9	0945	20-25 Olive to olive brown to olive gray fine to coarse sand and gravel with a little cobbles and little to traces of silt. Very moist to wet, massive.	PID=0.7	GW/GM		
				No unusual odors detected.	=0.6			
25					=0.7			
	Run #6 25-28	2.8	1005	25-26.5 Olive brown to yellowish orange brown fine to coarse sand and gravel with trace of silt. Slight "metallic" odor.	PID=0.2 =1.0	GW/GM	Yes	
	QC-SB-445-25/27-XXX		1015	26.5-27.5 Olive gray to gray gravel and cobbles in a silty fine to coarse sand matrix. Material appears to be weathered/pulverized rock.	=0.4			
				Becomes very hard at 27.5				
				27.5-28' Rock fragments cobble and gravel sized. Estimate top of rock to be 26.5				
30								

Notes

Bottom of boring = 28' BGS

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Jerry Rawcliffe

Boring: SB-445

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-446
File No.:

Contractor: Boart Longyear	Drilling Method: RotoSonic		
Operator: Dale Dischert	Bore Hole ID/OD: 4 7/8 OD inner casing/6" OD outer casing		
Logged By: Jerry Rauchfuss	Auger ID/OD: N/A		
Checked By: CTH	Sampler: Dane Clapsaddle		
Date Start/Finish: 8/25/09	Hammer Wt./ Fall: N/A		
Boring Location: Area 4	Water Level[3]: 9.7' in borehole/new casing		
Ref. Elevation[1]:	est 7-8' based on soils.		

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	3.6	0800	Concrete 0-0.6 PID = 32 ppm			
	OC-SB-446-0/1.0-XXX		0805	0-5 light brown to light grayish brown fine to medium sand. Moist, slight layered appearance. Some dark brown to black organic layers (but no visible organic debris; twigs/leaves) =28	SP	Yes	
5				No unusual odors detected =31 Traces of gravel at top of interval. =34 =29			
	Run #2 5-10	4.9	0805	5-8 light brown to light grayish brown fine to medium sand with traces of coarse sand along some indistinct layers. Very moist. PID = 0	SP		
	OC-SB-446-5/7-XXX		0820	some gravel at 7.5-8' interval. =0		Yes	
	XXD						
	XMS/MSD						
10				8-to 9.5 light brown fine to medium sand with a trace of coarse sand. Wet. =0 9.5-10 Brown to dark brown fine to medium sand with a trace of coarse sand =0	SP SP		
	Run #3 10-15	5.2	0810	10-11 light brown fine-medium sand with a trace of coarse sand and gravel. Wet. PID = 0			
				11-12.5 Olive gray to gray to brown fine to coarse sand and gravel with some cobbles and a trace of silt. Wet =0 Top is grayish bottom is brown.	GW		
				12.5-13 light brown fine to coarse sand and gravel with a trace of silt. Very moist to wet. =0 13-15 Olive brown fine to coarse sand and gravel with some silt. very moist to wet massive, wide range of grain size. =0	GW/GM		
15							

Notes
PID readings from 0-5 are suspect - filter got plugged - cleaned and recalibrated. rescreened 0-5 and got no readings > 0.1. PID passed positive response test with sharpie.

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Jerry Rauchfuss

Boring: SB-446

MACTEC

	Project: Olin Chemical Superfund Site Location: Wilmington, MA Client: Olin	Boring: SB-446 File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic	**Definitions:** S = Split Spoon Sample U = Thin Wall Tube Sample R = Rock Core Sample V = Insitu Vane Shear Test q_u = Unconfined Compressive Strength (psf) woh = weight of 140 lb. hammer wor = weight of rods wc = Water Content, percent oc = Organic Content, percent
Operator: Dale Dysdale	Bore Hole ID/OD: 4 7/8" OD inner casing / 6" OD outer casing	
Logged By: Jerry Rawcliffe	Auger ID/OD: NA	
Checked By: CTH	Sampler: Dave Chapman	
Date Start/Finish: 8/25/09	Hammer Wt./ Fall: NA	
Boring Location: Area 4	Water Level[3]: 9.7' in borehole w casing -	
Ref. Elevation[1]:	est 7-8 Based on soils -	

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	4.9	0815	15-16 Olive brown fine to coarse sand and gravel with some silt. Wet, meassure. PID = 0	GW/GM		
	OC-SB-446-15/17-XXX		0900	16-16.5 Brown to slightly reddish brown (iron stained?) fine to coarse sand and gravel with a trace of silt. = 0	GW	Yes	
				16.5-20 Olive to olive brown fine to coarse sand and gravel with a trace of silt. Wet, with some coarser grained layers. = 0 = 0	GW		
20	Run #5 20-25	4.8	0825	20-20.8 Olive to olive brown fine to coarse sand and gravel with a trace of silt. PID = 0	GW		
				20.8-21.8 Olive gray to light yellowish brown fine to medium sand with silt and some cobbles traces of gravel. Very moist, "metallic odor" detected. = 0	SM		
				21.8-25 Gray to olive gray Cobbles with gravel and some fine to coarse sand and rock flour (Cobble zone with lots of pulverized rock.) = 0 = 0			
25	Run #6 25-30	3.6	0855	Gray to light gray gravel and cobbles in rock flour (pulverized rock). PID = 0			
				Top of weathered rock estimated to be 21.8' = 0			
				Bottom of boring = 30' BGS			
				Rock appears to be very weathered at this location			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client:

Boring: SB-447
File No.:

Contractor: Boart longyear
Operator: Greg Halliday
Logged By: Terry Rawcliffe (Geologist)
Checked By: CTH
Date Start/Finish: 8/3/09
Boring Location: Area 4
Ref. Elevation[1]: (BGS)

Drilling Method: Roto Sonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4"/8.00 inner casing/6" OD outer casing
Sampler: Mark Maggiore
Hammer Wt./ Fall: NA
Water Level[3]: 6-8' Based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	4.1	0805	0-1.0 = Dark brown fine to coarse sand with a little silt and traces of gravel. Very moist to wet, grass + root fibers, some plastic trash. (Top soil fill). PID=0	SP	Yes	
	OC-SB-447-0/1.0	XXX	0810	1-2 light grey pulverized concrete =0.1			
				2-4 Brown to dark brown fine to medium sand with a little coarse sand and gravel. Moist. =2.5			
	OC-SB-447-3/5-XXX		0825	Reddish layer at 3.5-4 which appears to contain brick + ash. =2.5	SP	Yes	
5				4-5 Brown to dark brown fine to medium sand, moist. =0.8			
	Run#2 5-10	5.0	0810	5-5.5 Brown to dark brown fine to medium sand. Moist. PID=3.4			
				5.5-7.5 light brown to brown fine to medium sand with traces of silt. Stratified with some finer grained layers at (7-7.5'). No unusual odors =0.3 =0.1	SP		
				7.5-9' light reddish brown ("iron") stained. Fine to medium sand with traces of coarse sand. Very moist to wet, layered appearance. =0	SP		
10				9-10 Olive to dark olive grey fine to coarse sand and gravel with traces of cobbles and silt. Wet, massive =0.1	GW/GM		
	Run#3 10-15	5.0	0825	10-12 Olive brown to olive grey fine to coarse sand and gravel with traces to a little silt cobbles. Wet, massive. No unusual odors. PID=0.4 =0.2	GW/GM		
				12-13 Brown to olive brown fine to coarse sand with gravel and some silt and traces of cobbles =1.1	GM		
				Wet, massive - slight "metallic" odor. =0.5			
				13-15 Olive brown fine to coarse sand and gravel with a little cobbles and traces of silt. =0.3	GW/GM		
15				Very moist to wet. =0.8			

Notes

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Terry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client:

Boring: SB-447
File No.:

Contractor: Boart longyear
Operator: Greg Walmsley
Logged By: Terry Rawcliffe
Checked By: ctm
Date Start/Finish: 8/31/04
Boring Location: Area 4
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Marc Maggione
Hammer Wt./ Fall: NA
Water Level[3]: 6-8' BGS based on soils.

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wsh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20' (BA) 21'	4.8	0900	15-18 Olive to olive brown to brown fine to coarse sand and gravel with a little silt and cobbles. Wet, massive but with some brown layers. PID=0.8 =0.3	GW/GM		
				18-19.5 Brown to reddish/yellow brown fine to coarse sand and gravel with a trace of cobbles and silt. Wet, slight layered appearance and slight "metallic" odor. =7.3 =4.9	GW		
20	OC-SB-447-1820-XXX		0905 (BA) ~~0905~~	19.5-20 Olive gray fine to coarse sand and silt with some gravel and cobbles, Wet, massive =2.1		Yes	
	XXXXXX			20-21' Gray cobbles/rock. =1.4 Estimate top of rock at 20' BGS Bottom of boring = 21' BGS			
25							
30							

Notes

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Terry Rawcliffe

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-447**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/31/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 6-8' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	4.1	805	0-1' Dark brown fine to coarse sand with a little silt and traces of gravel. Very moist to wet, grass and root fibers, some plastic trash. (Topsoil fill).	0	SP	YES	
	OC-SB-447-0/1.0-XXX		810	1-2' Light gray pulverized concrete.	0.1			
				2-4' Brown to dark brown fine to medium sand with a little coarse sand and gravel. Moist, reddish layer at ~ 3.5-4' bgs which appears to contain brick and ash.	25			
	OC-SB-447-3/5-XXX		825		2.8		YES	
5				4-5' Brown to dark brown fine to medium sand. Moist.	0.8	SP		
	Run #2 5 - 10	5.0	810	5-5.5' Brown to dark brown fine to medium sand. Moist.	3.4			
				5.5-7.5' Light brown to brown fine to medium sand with a trace of silt. Stratified with some finer grained areas at 7-7.5' bgs.	0.3	SP		
				No unusual odors.	0.1			
				7.5-9' Light reddish brown ("iron") stained fine to medium sand with traces of coarse sand. Very moist to wet, layered appearance.	0	SP		
10				9-10' Olive to dark olive gray fine to coarse sand and gravel with traces of cobbles and silt. Wet, massive.	0.1	GW/GM		
	Run #3 10 - 15	5.6	825	10-12' Olive brown to olive gray fine to coarse sand and gravel with traces to a little silt and cobbles. Wet, massive.	0.4			
				No unusual odors.	0.2	GW/GM		
				12-13' Brown to olive brown fine to coarse sand with gravel some silt and traces of cobbles. Wet, massive, slight "metallic" odor.	1.1			
					0.5	GM		
				13-15' Olive brown fine to coarse sand and gravel with a little cobbles and traces of silt. Very moist to wet	0.3			
15					0.8	GW/GM		

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-447**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/31/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 6-8' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 21	4.8	900	15-18' Olive to olive brown to brown fine to coarse sand and gravel with a little silt and cobbles. Wet, massive, but with some brown layers.	0.8	GW/GM		
					0.3			
				18-19.5' Brown to reddish/yellow brown fine to coarse sand and gravel with a trace of cobbles and silt. Wet, slight layered appearance and slight "metallic" odor.	7.2			
	OC-SB-447-18/20-XXX		905		4.9	GW	YES	
20				19.5-20' Olive gray fine to coarse sand and silt with some gravel and cobbles. Wet, massive.	2.1			
				20-21' Gray cobbles/rock. Estimate top of rock at 20' bgs. Bottom of boring = 21' bgs	1.4			
25								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-448
File No.:

Contractor: Boart Longyear
Operator: Dale Dyscher
Logged By: Jerry Rawcliffe
Checked By: ctm
Date Start/Finish: 8/25/09
Boring Location: Area 1
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 4 7/8" OD, inner casing/6" OD outer casing
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 6.5' BGS measured in borehole.

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	4.5	1000	0-2.5 Brown to dark brown fine to medium sand with traces of gravel and silt. Moist, massive (Topsoil Fill). PID=14.8			
	OC-SB-448-0/10-XXX		10:05	Piece of Geofabric at 2.5'. =17.4			
				2.5-5.0 Gray gravel riprap fill. =13.2			
5				=9.8			
	Run #2 5-10	5.0	1005	5-9' Gray gravel riprap fill PID=15 Very moist, becomes wet. =18			
				Piece of Geotextile at 9'			
				=22			
			1020	9-10 Gray to olive gray fine to coarse sand with silt and gravel and traces of cobbles.			
	OC SB-448-5/10-XXX		1300	Wet, massive. =34			
10							
	Run #3 10-15	4.8	1015	10-12.4 Gray to olive gray riprap fill. Wet (Possible cavein) or Fill for leveling base for Geotextile. PID=13			
				=15			
				12.4 -13 Olive to olive gray fine to coarse sand and silt with some gravel. Wet, massive	GM		
				13-14 light gray gravel and cobbles on rock floor (poss.) broken up cobbles. =0			
				14-15 Olive to dark olive brown fine to coarse sand and gravel with some silt. Very moist, micaceous, some dark coloration that appears to be associated with micaceous areas. =0.5 =5.0			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Boring: SB-448

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-448
File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic
Operator: Dale Drescher	Bore Hole ID/OD: 4 7/8" OD inner casing / 6" OD outer casing
Logged By: Jerry Rawcliffe	Auger ID/OD: NA
Checked By: crm	Sampler: Dave Chapman
Date Start/Finish: 8/25/09	Hammer Wt./Fall: NA
Boring Location: Area 1	Water Level[3]: 6.5 measured in borehole
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run# 4 15-20	4.0	1040	15-17 Olive gray to dark olive gray gravel and cobbles with fine to coarse sand silt. Wet. PID = 2, =20	GW		
				17-19 Olive brown fine to coarse sand and gravel with traces of cobbles and silt. Wet, massive =5	GW/SW		
	OC-SB-448-17/19-xxx		1045	19-20 Gray gravel and cobbles in rock flour with some fine to medium sand =32, =51			
20				Estimate top of bedrock at 19' BGS			
				Bottom of boring = 20' BGS.			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Page 2 of 2

Boring: SB-448

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-448**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/25/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 1	**Water Level: 6.5' bgs measured in borehole**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	4.5	1000					
	OC-SB-448-0/1.0-XXX		1005	0-2.5' Brown to dark brown fine to medium sand with traces of gravel and silt. Moist, massive. (Topsoil fill).	14.8		YES	
				Piece of geofabric at 2.5' bgs.	17.4			
						FILL		
5				2.5-5' Gray gravel rip rap fill.	13.2			
					9.8			
	Run #2 5 - 10	5.0	1005					
				5-9' Gray gravel rip rap fill. Very moist, becomes wet.	15			
					18	FILL		
				Piece of Geotextile at 9'	22			
	OC-SB-448-8/10-XXX		1030	9-10' Gray to olive gray fine to coarse sand with silt and gravel and traces of cobbles. Wet, massive.	34			
10								
	Run #3 10 - 15	4.8	1015	10-12.4' Gray to olive gray rip rap fill. Wet, possible cave-in) or fill for leveling base for Geotextile.	13	FILL		
				12.4-13' Olive to olive gray fine to coarse sand and silt with some gravel. Wet, massive.	15			
				13-14' Light gray gravel and cobbles in rock flour (possible) broken up cobble.	0	GM		
				14-15' Olive to dark olive brown fine to coarse sand and gravel with some silt. Very moist, micaceous, some dark coloration that appears to be associated with micaceous areas	0.5			
15					5.6			

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-448**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/25/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 1	**Water Level: 6.5' bgs measured in borehole**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	4.0	1040	15-17' Olive gray to dark olive gray gravel and cobbles with fine to coarse sand and silt. Wet.	2	GW		
				17-19' Olive brown fine to coarse sand and gravel with traces of cobbles and silt. Wet, massive.	20			
					5	GW/SW		
	OC-SB-448-17/19-XXX		1045	19-20' Gray gravel and cobbles in rock flour with some fine to medium sand.	32		YES	
20				Estimate top of rock at 19' bgs.	51			
				Bottom of boring = 20' bgs				
25								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington MA.
Client: Olin

Boring: SB-449
File No.:

Contractor: Boart Longyear
Operator: John Coulia
Logged By: Jerry Rawcliffe
Checked By: JRM
Date Start/Finish: 8/27/09
Boring Location: Area 2
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 4 7/8" OD tricone casing/6" OD overcasing
Auger ID/OD: N/A
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 7.6 and rising
5-6' Based on soils (BES)

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wsh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	4.0	1510	0-0.2 Asphalt PID=0.2			
	OC-SB-449-0/10-XXX		1515	0-0.6 Brown fine to coarse sand and gravel with a trace of silt (Asphalt subgrade). Moist. =0.3		Yes	
				0.6-4.0 Slightly reddish brown to light brown fine to medium sand with a trace of silt. Moist. =0.1	SP		
5				4-5 Brown fine to medium sand with a little to a trace of silt. Very moist. =0.4 No unusual odors. =0.2	SP		
	Run#2 5-10	4.9	1515	5-7.5 Brown to dark brown fine to medium sand with some to a little coarse sand. PID=0.4 Wet with some layering coarser grained layers are darker colored. Slight odor (metallic?) =16.8	SP		
	OC-SB-449-6/8-XXX		1500	7.5-8 Light brown cobbles and gravel in	GW	Yes	
10				Fine to coarse sand, m 8-9.5 Brown to dark brown and gravel with a little 9.5-10 Olive brown fine to coarse gravel and some to a little silt. Very moist stained	GW		
	Run#3 10-15	4.8	1525	10-10.5 Brown fine to medium and some coarse sand and Wet.	SP/SW		
	OC-SB-449-11/13-XXX		1600	10.5-13' Brown to olive brown sand and gravel with a little of	GW		
				cobbles. Slight unusual odor 13-15' Cobbles. =17.9 (PID)			

Notes
Soils from 11-13' were very warm to Hand

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Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-449
File No.:

Contractor: Boart Longyear
Operator: John Coralia
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 8/27/09
Boring Location: Area 2
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 4 7/8" OD rinse casing/6" OD overcasing
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 7.6 and rising
5-6' BGS based on soils.

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wsh = weight of 140 lb. hammer
war = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-18.5	3.7	1600	15-16.5 Brown to olive brown fine to coarse sand and gravel with some cobbles and a little silt. Wet, slight odor. PID=3.8 =0.9	GW		
				16.5-17.5 Olive to olive gray fine sand with some silt and medium to coarse sand and gravel and trace of cobbles =2.8	GM		
20				17.5-18.5 Cored piece of rock and pulverized rock =3.2			
				Estimate top of bedrock at 17.5' BGS			
				Bottom of boring = 18.5' BGS			

Notes

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Jerry Rawcliffe

Boring: SB-449

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-449**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/25/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 1	**Water Level: 6.5' bgs measured in borehole**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	4.0	1510	0-0.2' Asphalt 0-0.6' Brown fine to coarse sand and gravel with a trace of silt (Asphalt sub grade). Moist.	0.2	SP	YES	
	OC-SB-449-0/1.0-XXX		1515					
				0.6-4' Slight reddish brown to light brown fine to medium sand with a trace of silt. Moist.	0.3			
					0.1			
				4-5' Brown fine to medium sand with a little to a trace of silt. Very moist. No unusual odors.	0.4	SP		
5					0.2			
	Run #2 5 - 10	4.9	1515	5-7.5' Brown to dark brown fine to medium sand with some to a little coarse sand. Wet, with some layering. Coarser grained layers are darker colored. Slight odor ("metallic").	0.4	SP		
					16.8	GW		
	OC-SB-449-6/8-XXX		1520	7.5-8' Light brown cobbles and gravel in fine to coarse sand. Moist.	15.3		YES	
				8-9.5' Brown to dark brown fine to coarse sand and gravel with a little silt. Wet.		GW		
				9.5-10' Olive brown fine to coarse sand with some gravel and some to a little silt. Very moist to wet.	2.8	GM/GW		
10					9.6			
	Run #3 10 - 15	4.8	1525	10-10.5' Brown fine to medium sand with some coarse sand and traces of gravel. Wet.	270	SP/SW		
							YES	
	OC-SB-449-11/13-XXX		1600		180			
				10.5-13' Brown to olive brown fine to coarse sand and gravel with a little silt and traces of cobbles. Slight unusual odor.	95	GW		
				13-15' Cobbles.	195			
15								

Notes

Jerry K. Rawcliffe

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MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-449**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Dale Duscher	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/25/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 1	**Water Level: 6.5' bgs measured in borehole**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 18.5	3.7	1600	15-16.5' Brown to olive brown fine to coarse sand and gravel with some cobbles and a little silt. Wet, slight odor.	3.8	GW		
				16.5-17.5' Olive to olive gray fine sand with some silt and medium to coarse sand and gravel and traces of cobbles.	0.9			
					2.8	GM		
				17.5-18.5' Cored piece of rock and pulverized rock.	3.2			
20				Estimate top of bedrock at 17.5' bgs.				
				Bottom of boring = 18.5' bgs				
25								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-450
File No.:

Contractor: Boart longyear	Drilling Method: RotoSonic
Operator: Greg Ballard	Bore Hole ID/OD: 6" OD
Logged By: Jerry Rawcliffe	Auger ID/OD: 4"/8" OD inner casing/6" OD outer casing
Checked By: CTM	Sampler: Dave Chapman
Date Start/Finish: 4/9/09	Hammer Wt./ Fall: NA
Boring Location: Area 4	Water Level[3]: ~~2.5~~ 3.65 based on soils observations.
Ref. Elevation[1]:	6-7'

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	Run #1 0-5	4.8	1330	0-2.5 Dark brown fine and ground with a trace (wood PID = 0.4 soil.)	SW	Yes	
	OC-SB-450-0/1.0-XXX		1340	2.5-3.5 Dark brn fine and a little fine to a coarse sand	SP		
5				3.5-5 Very light gray pulverized concrete. (Sidewall of foundation). Dry. =0.1 =1.4 =2.7			
	Run #2 5-10	3.8	1350	5-6 Gray to light gray	SW		
				6-7 Brown to dark brown with traces of coarse sand and debris, wood fragments and decomposed organics. roots	SP		
10	OC-SB-450-8/10-XXX		1355	7-9 Brown to light reddish brn to medium sand with a trace some areas with reddish ( ) to wet.	SP	Yes	
				9-10 Brown to light brown ne			
	Run #3 10-15	3.7	1405	10-13' light brown medium to fine sand PID=0 with traces of coarse sand. Wet.	SP		
				13-14 Slightly reddish brown medium to fine sand with a trace of coarse sand. Wet. =0			
15				14-15 Brown medium sand with some coarse sand and a little fine sand and a trace of gravel. Wet. =0 =0	SP		

Notes

Angle Boring under foundation # 4

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
Boring:	SB-450
File No.:	

Contractor:	Boart Longyear
Operator:	Greg Halliday
Logged By:	Jerry Rawcliffe
Checked By:	ctm
Date Start/Finish:	9/9/09
Boring Location:	Area 4
Ref. Elevation[1]:	
Drilling Method:	Roto Sonic
Bore Hole ID/OD:	6" OD
Casing ID/OD:	4 7/8 OD inner casing / 6" OD outer casing
Sampler:	Dave Chapman
Hammer Wt./ Fall:	NA
Water Level[3]:	~~7-8~~ BGS Based on soils observations. 6-7

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	3.5	1430	15-17.5 light brown fine sand. Wet, becomes slightly coarser w. Reddish ("iron") stained layer at ≈16.5B. PID = 0			
				17.5-20 light brown to reddish brown medium sand with traces of fine and coarse sand. Wet. No unusual odors detected. =0	SP		
20				=0			
	Run #5 20-25	4.3	1500	20-21 Brown medium sand with a little coarse sand and a little to traces of fine sand. PID = 0.1	SP		
				21-22 Dark brown to olive brown to olive medium to coarse sand with some fine sand and gravel and traces of cobbles and silt. Wet, "rotten" odor	G		
				22-25 Dark olive to olive brown fine to coarse sand and gravel with some cobbles and a little to a trace of silt. Wet, massive. =0.3 =0			
25				=0			
	Run #6 25-30	2.2	1545	25-30 Dark olive to dark olive grey to olive brown fine to coarse sand and gravel with some cobbles and a little to a trace of silt. Wet, massive. No unusual odors detected. PID=0 =0			
30							

Notes

Angle boring (45°) under foundation.

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site	**Location:** Wilmington, MA	**Client:** Olin
Boring: SB-450	**File No.:**	

Contractor: Boart Longyear	**Drilling Method:** RotoSonic
Operator: Greg Halliday	**Bore Hole ID/OD:** 6" OD
Logged By: Jerry Rawcliffe	**Casing ID/OD:** 4 7/8 OD inner casing / 6" OD outer casing
Checked By: CTM	**Sampler:** Dave Chapman
Date Start/Finish: 9/9/09	**Hammer Wt./Fall:** NA
Boring Location: Area 4	**Water Level[3]:** ~~7-8~~ BGS Based on soils observations (initials) 6-7'
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
30	Run #7 30-35	4.0	1625	30-31 Dark grey fine to coarse sand and gravel with a little silt and cobbles Wet PID=0.1 31-32 Dark olive grey to dark olive fine to co sand and gravel with a little silt and cobbles —	GW/GM		
				32-35 Olive to olive brown fine to coarse sand and gravel with some cobbles and a little silt. Becomes finer grained silty at bottom of interval. =0	GW/GM		
35	OC-SB-450-33/35		1655			Yes	
	Run #8 35-37.5	0	1655	Encountered hard material at 35' drilled to 37.5 through very hard material. Estimate top of bedrock = 35.0 to 35.5' ~~[illegible]~~ (initials) Bottom of boring = 37.5' ~~[illegible]~~	NR		
40				Linear Borehole Footage Estimate top of rock ≈ 27' BGS Bottom of boring ≈ 28' BGS			
45							

Notes

Angle Boring (45°) under foundation

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-450**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/9/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 6-7' bgs based on soils observations**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	4.8	1330					
	OC-SB-450-0/1.0-XXX		1340	0-2.5' Dark brown fine to coarse sand and gravel with a trace of silt (Loamy topsoil).	0.9	SW	YES	
				2.5-3.5' Dark brown fine to medium sand with a little to a trace of silt. Moist.	0.2			
				3.5-5' Very light gray pulverized concrete. (Sidewall of foundation). Dry.	0.1	SP		
					1.4			
5					2.7			
	Run #2 5 - 10	3.8	1350	5-6' Gray to light gray pulverized concrete.				
					0	SW		
				6-7' Brown to dark brown fine to medium sand with traces of coarse sand and some organic debris. Wood fragments and very dark brown decomposed organics.				
					0	SP		
				7-9' Brown to light reddish brown fine to medium sand with a trace of coarse sand. Some areas with reddish (iron) staining. Very moist to wet.	0			
	OC-SB-450-8/10-XXX		1355				YES	
					0	SP		
10				9-10' Brown to light brown fine to medium sand . Wet.				
	Run #3 10 - 15	3.7	1405					
				10-13' Light brown medium to fine sand with traces of coarse sand . Wet.	0			
						SP		
				13-14' Slightly reddish brown medium to fine sand with a trace of coarse sand. Wet.	0			
					0			
				13-14' Brown medium sand with coarse sand and a little fine sand and a trace of gravel. Wet.		SP		
					0			
15								

Notes

Angle boring under foundation at ~ 45°

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-450**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/9/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 6-7' bgs based on soils observations**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	3.5	1430	15-17.5' Light brown fine to medium sand . Wet, becomes slightly coarser with depth. Reddish (iron) stained layer at ~16.5' bgs.	0	SP		
					0			
				17.5-20' Light brown to reddish brown medium sand with traces fine and coarse sand. Wet, no unusual odors detected.	0	SP		
					0			
20								
	Run #5 20 - 25	4	1500	20-21' Brown medium sand with a little coarse sand and a little to traces of fine sand.	0.1	SP		
				21-22' Dark brown to olive brown to olive medium to coarse sand with some fine sand and gravel and traces of cobbles and silt. Wet, "rotten" odor.	0.7	GW		
					0.3			
				22-25' Dark olive to olive brown fine to coarse sand and gravel with some cobbles and little to a trace of silt. Wet, massive.	0	GW/GM		
25					0			
	Run #6 25 - 30	2	1545		0			
				25-30' Dark olive to dark olive gray to olive brown fine to coarse sand and gravel with some cobbles and a little to a trace of silt. Wet, massive.				
					0	GW/GM		
				No unusual odors detected.				
					0			
					0			
30								

Notes

Angle boring under foundation at ~ 45°

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-450**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/9/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 6-7' bgs based on soils observations**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
30	Run #7 30 - 35	4.0	1625	30-31' Dark gray fine to coarse sand and gravel with a little silt and cobbles. Wet.	3.8	GW		
					0.9			
				31-32' Dark olive gray to dark olive fine to coarse sand and gravel with a little silt and cobbles.	2.8	GM		
				32-35' Olive to olive brown fine to coarse sand and gravel with some cobbles and a little silt. Becoming finer grained silty at bottom of interval	3.2			
	OC-SB-450-33/35-XXX		1655				YES	
35								
	Run #8 35 - 37.5	0	1655	Encountered hard material at 35'. drilled to 37.5 through very hard material. No recovery. Estimate top of bedrock = 35 to 35.5' bgs. Bottom of boring = 37.5' bgs. (Linear borehole footage)				
				Actual depth (due to 45º angle) Estimate top of rock ~27' bgs. Bottom of boring ~28' bgs.				
40								
45								

Notes

Angle boring under foundation at ~ 45º

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-451
File No.:

Contractor: Boart Longyear
Operator: John Graglia
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 8/28/09
Boring Location: Area 4
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 4 7/8 Innercore / 0 to Casing OD
Auger ID/OD: NA
Sampler: Phil Mueller
Hammer Wt./ Fall: NA
Water Level[3]: 5-6' Based on soils.

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	3.9	1110	0-0.5 Brown fine sand with some silt and a little gravel and medium to coarse sand. Dry, root fibers. (Topsoil.) PID=0	SW	Yes	
	OC-SB-451-0/1.0	XXX	1120	0.5-2.5 light brown to brown to grayish brown to dark brown. Stratified layers of medium sand and gravel with traces of coarse sand and silt. Dry to moist. =0	SW/GW		
5	OC-SB-451-2.5/4.5-XXX		1140	2.5-5' layered fine to medium sand - Brown to light brown to dark brown to black. moist. 2.8-3.2 Dark brown layer with fragments of black plastic like material =0 4.5-5.7 very dark brown to black organic layer.	SP	Yes	
	Run #2 5-10	4.4	1115	5-5.5 Brown fine to medium sand with a trace of silt. Very moist. PID=0	SP		
				5.5-7 Reddish/orange brown fine to medium sand with a trace of silt. Very moist to wet. =0.1			
				7-8 Brown with dark brown spots/inclusions root fibers =0			
10				Fine to medium sand with a trace of silt. Wet. 8-10 Brown to light brown fine to medium sand with traces of coarse sand and silt. Wet. =0.2 No unusual odors detected =0.1	SP		
	Run #3 10-15	3.9	1120	10-15' Brown to light brown fine to coarse sand with a trace of silt. Wet stratified with coarse grained layers, and some finer grained layers with traces of silt. PID=0 =0.1	SP		
15				=0 =0.2			

Notes
* Encountered pieces of what appears to be black plastic - initial appearance to be anthracite coal but is pliable. (2.5' BGS)

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-451
File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic		**Definitions:**
Operator: John Gengler	Bore Hole ID/OD: 6"		S = Split Spoon Sample
Logged By: Jerry Rawcliffe	Casing ~~Auger~~ ID/OD: Inner OD = 4 7/8, Outer OD = 6"		U = Thin Wall Tube Sample
Checked By: CTM	Sampler: Phil Miller		R = Rock Core Sample
Date Start/Finish: 8/28/09	Hammer Wt./ Fall: NA		V = Insitu Vane Shear Test
Boring Location: Area 4	Water Level[3]: 5-6' BGS Based on soils		q_p = Unconfined Compressive Strength (psf)
Ref. Elevation[1]:			woh = weight of 140 lb. hammer
			wor = weight of rods
			wc = Water Content, percent
			oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run#4 15-20'	4.4'	1235	15-18' Brown to light brown sand with a little to a trace wet, some light layering w/ gravel layers. PID = 0 / gravel = 0. / 18-18.5 Reddish brown fine to coarse sand and gravel with traces of cobbles. Wet. Slight odor = 0	SP		
	OC-SB-451-18/20	-xxx	1250	18.5-20 Olive to olive brown fine to coarse sand and gravel with a little silt and traces of cobbles. Wet. = 0 / 20.2	GW / GW/GM	Yes	
20							
	Run#5 20-26	5.1	1250	20-23' Olive to light yellowish olive fine to medium sand with gravel and coarse sand and a little to traces of silt and cobbles. Wet, massive. PID = 0.2 / 23-25 Gray to dark gray fine to medium sand with some silt and gravel and a little cobbles. Wet massive 20.1 / 20.4 / 25-26 Gray cobbles and rock fragments. 26.1 / 23.8	GW	slight "metallic" odor / see N	
25							
				Estimate top of bedrock = 25' BGS / Bottom of boring = 26' BGS			

Notes

Soils are warm to hot to the touch from the drill
pH of water from borehole = 6-8 using pH indicator

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Boring: SB-451

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client:

Boring: SB-452
File No.:

Contractor: Beard Long years
Operator: Greg Halliday
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 8/31/09
Boring Location: Area 4
Ref. Elevation[1]:

Drilling Method: Rotosonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4"/8.00 inner casing / 6" OD outer casing
Sampler: Marc Maggiore
Hammer Wt./ Fall: NA
Water Level[3]: 5-6' BGS Based on soils.

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	3.6	1025	0-0.7 Brown to light brown fine to medium sand with a little silt coarse sand and gravel. Dry to moist (Topsoil fill). PID= 0			
	OC-SB-452-0/1.0-xxx		1030			Yes	
				0.7-1.8 light brown to brown fine to medium sand. Moist, some stratification of darker + lighter colored layers. =0.1			
				1.8-2.2 Very dark brown to black fine sand with organic material (root fibers, plant fragments) Peaty layer. =0	SP		
5				2.2-5 Brown fine to medium sand with traces of silt and coarse sand. Very moist. No unusual odors. =0.1			
	Run #2 5-10	4.2	1030	5-7.5 Brown to light brown fine to medium sand with some layers containing coarse sand. Wet PID= 0	SP		
	OC-SB-452-5/7-xxx		1045	7.5-8 Brown fine to coarse sand and gravel with traces of silt and cobbles. =0.1	SW/GW	Yes	
				8-10 Olive to olive brown fine to coarse sand and gravel with some to a little cobbles and a little silt. Wet, massive. No unusual odors. =0.1 =0 =0.1	GW/GM		
10							
	Run #3 10-16	5.9	1050	10-11.5 Brown to olive brown fine to medium sand with some coarse sand and gravel. Wet. PID= 0	SW		
				11.5-15 Olive brown to olive to olive gray fine to coarse sand and gravel with a little silt and traces of cobbles. Very moist to wet, massive. =0.1	GW/GM		
	OC-SB-452-13/15-xxx		1100	Faint ammonia-like odor =0.7		Yes	
15				Encountered bedrock material at 15' BGS =0.9			

Notes
Estimated top of bedrock = 15' BGS
Bottom of boring = 16' BGS.

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Boring: SB-452

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-452**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 4 7/8" OD inner casing/ 6" OD outer casing**
Logged By: Jerry Rawcliffe	**Auger ID/OD: NA**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 8/31/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: estimate 5-6' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	3.6	1025	0-0.7' Brown to light brown fine to medium sand with a little silt coarse sand and gravel. Dry to moist (Topsoil Fill).	0		YES	
	OC-SB-452-0/1.0-XXX		1030	0.7-1.8' Light brown to brown fine to medium sand. Moist, some stratification of darker and lighter colored layers.	0.1			
				1.8-2.2 ' Very dark brown to black fine sand with organic material (root fibers, plant fragments) Peaty layer.	0.0	SP		
5				2.2-5' Brown fine to medium sand with traces of silt and coarse sand . Very moist, no unusual odors.	0.1			
	Run #2 5 - 10	4.2	1030		0.3			
				5-7.5' Brown to light brown fine to medium sand with some layers containing coarse sand . Wet.	0	SP		
	OC-SB-452-5/7-XXX		1045		0.1	SW/GW	YES	
				7.5-8' Brown fine to coarse sand and gravel with traces of silt and cobbles .	0.1			
				8-10' Olive to olive brown fine to coarse sand and gravel with some to a little cobbles and a little silt. Wet, massive. No unusual odors.	0	GW/GM		
10					0.1			
	Run #3 10 - 16	5.9	1050	10-11.5' Brown to olive brown fine to medium sand with some coarse sand and gravel. Wet.	0	SW		
				11.5-15' Olive brown to olive to olive gray fine to coarse sand and gravel with a little silt and traces of cobbles. Very moist to wet, massive.	0.1			
					0.1	GW/GM		
	OC-SB-452-13/15-XXX		1100	Faint ammonia-like odor Encountered hard material at 15' bgs. Estimate top of bedrock is ~ 15' bgs.	0.7		YES	
15				Bottom of boring = 16' bgs.	0.9			

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-453
File No.:

Contractor: ZEBRA
Operator: Jason Fredericks
Logged By: Jerry Rawcliffe
Checked By: Chris Marshall
Date Start/Finish: 9/17/09
Boring Location: Area 1
Ref. Elevation[1]:

Drilling Method: Direct Push
Bore Hole ID/OD: 1.5"/3" (cast iron shoe)
Auger ID/OD: N/A
Sampler: Dave Chapman
Hammer Wt./ Fall: N/A
Water Level[3]:

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Sleeve #1 0-5	3.1	1500	0-1.5 Dark brown to black organic PID = 0 debris - Wet decayed leaves, roots, plant fragments becomes more decayed fines increased with depth.	Pt	Yes	
	OC-SB-453-0.0/1.0-XXX		1625	1.5-3.5 Brown to dark brown fine to medium sand and organics. = 0	SP		
5	OC-SB-453-1.0/6.0-XXX		1600	3.5-5 Brown to olive brown fine to coarse sand and gravel with traces of cobbles and silt. = 0 Wet, massive	GW/GM	Yes	
	Sleeve #2 5-6	0.7	1540	5-6 Brown to olive brown fine to coarse PID = 0.1 sand and gravel. Wet, massive			
10				Made 9 attempts to penetrate beyond 6' most attempts met refusal at 3-4' BGS. Bottom of boring = 6' BGS			
15							

Notes
Collected surface soil sample (0-1') using spade, ss bowl + ss spoon.

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Page 1 of 1
Boring: SB-453

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-454
File No.:

Contractor: Boarthmyer
Operator: John Coralia
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 8/27/09
Boring Location: Area 2
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 4 7/8" OD tricone casing/6" OD overcasing
Auger ID/OD: N/A
Sampler: Dave Chapman
Hammer Wt/ Fall: N/A
Water Level[3]: ≈5' BGS based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wwh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	3.7	1705	0-1.5 Asphalt and RR grade	.5		
	OC-SB-454-0/1.0-XXX		1710	1.5-5.0 light brown to sand with a trace of silt wet Very moist. Becomes darker brown and	SP	Yes	
5				slightly finer grained with depth.	=0.2		
					=0.4		
					=0.5		
	Run #2 5-10	4.8	1710	5-9 Brown to slightly reddish brown (unstained) fine to medium sand with a little to a trace of coarse sand. Wet, reddish brown layer at ≈ 5.8-6.2' BGS. Becomes	PID=0.5		
					=0.2	SP	
	OC-SB-454-6/8-XXX		1715	slightly coarser with depth.	=0.3	Yes	
				9-10 Brown to olive brown fine to coarse sand and gravel with a trace of silt.	=0.2	SW/GW	
10				Wet, moist. No unusual odors.	=0.4		
	Run #3 10-15	4.8	1715	10-13 Olive brown to dark olive fine to coarse sand and a little silt and trace co		GW/GM	
				13-15 light gray to light olive gray gravel and fine to coarse sand with a little cobbles and traces of silt. Moist moist.	=1.1	GW	
15					=1.0		

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-454
File No.:

Contractor: Boart Longyear
Operator: John Coulia
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 8/27/09
Boring Location: Area 2
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 4 7/8" OD inner casing/6" OD overcasing
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ≈ 5' BGS based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wob = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	4.9	1735	15-16.5 Olive to olive brown fine to coarse sand and gravel with some to a little silt. Moist. PID = 2.1 16.5-20 light gray to olive to dark gray gravel and fine to coarse sand with = 1.5	GW/GM		
				1 inch to 3 inches of cobbles and traces of silt. Moist to slightly moist. Slight layered appearance with different colored layers of similar material. ≥ 1.3 ≥ 2.0 ≥ 0.5	GW		
20	OC-SB-454-18/20-XXX		1745			Yo	
	Run #5 20-21	0	1750	Encountered hard material at 20' Drilled to 21' Estimate top of rock to be 20' BGS			
25				Bottom of boring = 21' BGS.			
30							

Notes

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Jerry Rawcliffe

Boring: SB-454

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-455
File No.:

Contractor: Boart Longyear
Operator: John Coralia
Logged By: Jerry Rawcliffe
Checked By: ctm
Date Start/Finish: 8/28/09
Boring Location: Area 4
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 4 7/8" OD inner casing/6" OD outer casing
Auger ID/OD: N/A
Sampler: ~~Dave Chapman~~ Phil Mullen
Hammer Wt./ Fall: N/A
Water Level[3]: 6-7' BGS based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification		Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	3.5	0825	0-0.5 Dark brown fine sand with some silt and a little medium sand and traces of coarse sand and gravel. Dry to moist, root fibers.	PID=0	SP/SM	Yes	
	OC-SB-455-0/1.0-XXX		0830	0.5-4.0 Brown fine sand with a ~~little~~ silt and a little gravel and traces of some ~~silt~~ medium to coarse sand. Dry, massive	=0			
5				4-5 Dark brown fine to medium sand with a trace of silt. Moist. No unusual odors detected.	=0 =0.1	SP		
	Run #2 5-10	4.6	0830	5-6 Dark brown to brown fine to medium sand with a trace of silt. Very moist.	PID=0.1			
	OC-SB-455-6/8-XXX		0840	6-8.3 Dark brown to very dark brown to black fine sand with some silt and traces of medium sand. Lots of decomposed organics mixed in with sand	=0.2 =0.1	PT	Yes	
10				Fibers and decomposed plant fragments (Peat) Stratified with sandy layers and layers with lots of organics. Wet.	=0			
				8.3-10 Brown to slightly reddish brown fine to medium sand with a trace of silt. Wet, no apparent structure, No unusual odors.	=1.1	SP		
	Run #3 10-15	4.5	0835	10-11.5 Slightly reddish brown to ~~brown~~ light brown fine to medium sand with traces of coarse sand along some layers and traces of silt. Wet.	PID=0 =0			
				11.5-15 light brown fine to medium sand with traces of silt. Wet.	=0.1 =0 =0			

Notes

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Jerry Rawcliffe

MACTEC

John Grelia

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin

Boring: SB-455
File No.:

Contractor:	Boart Longyear	Drilling Method:	Roto Sonic
Operator:	~~Dale Dysch~~	Bore Hole ID/OD:	4 7/8" OD inner casing / 6" OD outer casing
Logged By:	Jerry Rawcliffe	Auger ID/OD:	NA
Checked By:	CTM	Sampler:	~~Dave Chapman~~ Phil Muther
Date Start/Finish:	8/28/09	Hammer Wt./Fall:	NA
Boring Location:	Area 4	Water Level[3]:	6-7' Based on soils
Ref. Elevation[1]:			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run# 4 15-20	4.2	0840	15-20 light brown to brown to light olive brown fine to ? sand a little silt. Wet, stratified and coarser grained layers and brown ("iron") stained layers PID=0.1 =0	SP		
				silty layer at ≈17.5' iron stained fine sand layer ~~17.6-17.7~~ 17.7 silty layer at ≈18.5' coarser grained layers at 1 No unusual odors	SP		
20	Run#5 20-25	4.0	0855	20-21 Brown medium to coarse sand with a little fine sand. Wet. PID=0	SP		
				21-21.8 Brown medium to coarse sand with a little fine sand and a trace of gravel. Wet =0	GW (JR)		
				21.8-22.8 Olive brown fine to coarse sand and silt with gravel and some cobble	SP/GM		
				22.8-25 Gravel and co brown. with a little fine trace of silt. Wet. No unusual	GP		
25	Run#6 25-30	3.7	0910	~~Olive~~ 25-30 Olive to olive br f coarse sand and gravel w bles and silt. Wet, massive, N do detected.	GW		
	OC-SB-455-28/30	XXX	0930			Yes	
30							

Notes

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Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-455
File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic	Definitions:
Operator: John Graglia	Bore Hole ID/OD: 6" OD	S = Split Spoon Sample
Logged By: Jerry Rawcliffe	Auger ID/OD: NA	U = Thin Wall Tube Sample
Checked By: CTM	Sampler: Phil Muller	R = Rock Core Sample
Date Start/Finish: 8/28/09	Hammer Wt./ Fall: NA	V = Insitu Vane Shear Test
Boring Location: Area 4	Water Level[3]: 6-7' BGS based on soils	q_p = Unconfined Compressive Strength (psf)
Ref. Elevation[1]:		woh = weight of 140 lb. hammer
		wor = weight of rods
		wc = Water Content, percent
		oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
30	Run #7 30-35	5.1	0930	35-38 Olive gray to gray to dark gray fine to coarse sand and silt with gravel and cobbles. PID=0.1 wet, massive 20.2	GW/GW		
				38-40 Gray to olive gray to olive fine to coarse sand and gravel with some silt and cobbles. Wet massive. 20 (Rock flour) 20.4			
35	39						
	Run #8 35-40 (24)	4.9	0940	35-40 Gray to light gray fine sandy silt with cobbles gravel and medium-coarse sand. PID=0 Weathered pulverized bedrock 20.1			
				Estimate top of rock at 34.7 BGS.			
40				Bottom of boring = ~~40~~ 39' BGS (24) 20 20.4			
45							

Notes

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Jerry Rawcliffe

Boring: SB-455

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: SB-455
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: John Gralia	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Phil Muller**
Date Start/Finish: 8/28/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 6-7' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	3.5	825	0-0.5' Dark brown fine sand with some silt and a little medium sand and traces of coarse sand and gravel. Dry to moist, root fibers.	0	SP/SW	YES	
	OC-SB-455-0/1.0-XXX		830					
				0.5-4' Brown fine sand with silt and a little gravel and traces of medium to coarse sand. Dry, massive.	0			
5				4-5' Dark brown fine to medium sand with a trace of silt. Moist. No unusual odors detected.	0 0.1	SP		
	Run #2 5 - 10	4.6	830	5-6' Dark brown to brown fine to medium sand with a trace of silt. Very moist.	0.1			
				6-8.3' Dark brown to very dark brown to black fine sand with some silt and traces of medium sand . Lots of decomposed organics mixed in with root fibers and decomposed plant fragments (Peaty). Stratified with sandy layers and layers with lots of organics.	0.2 0.1	Pt	YES	
	OC-SB-455-6/8-XXX		840					
10				8.3-10' Brown to slightly reddish brown fine to medium sand with a trace of silt. Wet, no apparent structure. No unusual odors.	0 1.1	SP		
	Run #3 10 - 15	4.5	835	10-11.5' Slightly reddish brown at top to light brown to brown fine to medium sand with traces of coarse sand along some layers and traces of silt. Wet.	0 0	SP		
				11.5-15' Light brown fine to medium sand with traces of silt. Wet.	0.1 0			
15					0			

Notes

Jerry K. Rawcliffe

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MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-455**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: John Gralia	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Phil Muller**
Date Start/Finish: 8/28/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 6-7' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	4.2	840	15-20' Light brown to brown to reddish brown to light olive brown fine to coarse sand with a little silt. Wet, stratified with finer grained and coarser grained layers and some reddish brown (iron) stained layers.	0.1	SP		
					0			
				Silty layer at 17.5' bgs. Iron stained fine sand layer at 17.6-17.7' bgs.	0			
				Silty layer at ~18.5' bgs. Coarser grained layers at 18.1-18.3', 19-19.5' bgs.	0.1	SP		
20				No unusual odors.	0			
	Run #5 20 - 25	4	855	20-21' Brown medium to coarse sand with a little fine sand. Wet.	0	SP		
				21-21.8' Brown medium to coarse sand with a little fine sand and a trace of gravel. Wet.	0			
				21.8-22.8' Olive brown fine to coarse sand and silt with gravel and some cobbles. Wet.		GW/GM		
					0.1			
				22.8-25' Gravel and cobbles brown to olive brown with a little fine to coarse sand and a trace of silt. Wet.				
25				No unusual odors detected.	0	GP		
	Run #6 25 - 30	4	910		0			
				25-30' Olive to olive brown fine to coarse sand and gravel with a little cobbles and silt. Wet, massive.	0.1			
				No unusual odors detected.		GW/GM		
					0			
	OC-SB-455-28/30-XXX		930				YES	
					1.4			
30								

Notes

Jerry K. Rawcliffe

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MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-455**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: John Gralia	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Phil Muller**
Date Start/Finish: 8/28/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 4	**Water Level: 6-7' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
30	Run #7 30 - 35	5.1	930	35-38' Olive gray to gray fine to coarse sand and silt with gravel and cobbles. Wet, massive.	0.1			
					0.2	GW/GM		
				38-40' Gray to olive gray to olive fine to coarse sand and gravel with some silt and cobbles. Wet, massive.	0			
					0.4			
35	Run #8 35 - 39	5	940					
				35-39' Gray to light gray fine sandy silt (rock flour) with cobbles gravel and medium to coarse sand . Weathered pulverized bedrock.	0			
					0.1			
				Estimate top of bedrock = 34.7' bgs.	0			
				Bottom of boring = 39' bgs.	0.4			
40								
45								

Notes

Jerry K. Rawcliffe

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Boring: **SB-455**

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	CIMM
Boring:	SB-456
File No.:	

Contractor:	Boart Longyear	**Drilling Method:**	RotoSonic
Operator:	Greg Halliday	**Bore Hole ID/OD:**	6" OD
Logged By:	~~[illegible]~~ Dave Chapman	**Auger ID/OD:**	4 7/8 OD inner casing / 6" OD outer casing
Checked By:	CTM	**Sampler:**	Mark Maggiore
Date Start/Finish:	9/11/09	**Hammer Wt./Fall:**	NA
Boring Location:	Area 2	**Water Level[3]:**	approx 10' based on observations
Ref. Elevation[1]:			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No. (Sample Information)	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0 / 1 / 5	Run #1 0-5 OC-SB-456-0.0/1.0-XXX	3.1	8:25 8:30	Concrete 0-0.4 0.4-3.1: Brown-light brown sand. Some fines, some concrete powder dry. mostly uniform, trace cobble 2-3" in diameter	SP	Y	PID= 0.3 0.5
5 / 1 / ~~8~~ 10	Run #2 5-10 OC-SB-456-7.0/9.0-XXX	3.9 DUP/MS MSD	8:50 9:00	5-6.5: Mostly brown-dark brown med sand, some gravel, some cobble, some fines, dry 6.5-8.5: Brown-red brown medium sand some gravel, some cobble, dry	SP	Y	PID= 0.4 0.5 0.5
	~~Run #2 5-10~~ (DLC)			8.5-10: Light brown-tan med sand, some gravel, some cobbles (2-3") some fines, dry.			
10 / 1 / 15 / ~~10~~	Run #3 10-15	3.7	9:40	10-12: Brown-dark brown gravelly sand, some cobble, wet, non uniform 12-13: Brown-tan gravelly coarse sand poorly graded, wet	SP	N	PID= 0.3 0.5
15	~~Run #3~~ Run 4 15-20 OC-SB-456-16/18-XXX	3.6	10:15 10:40	13-15: Brown-reddish brown med-coarse sand, mostly uniform, wet 15-17: Brown-red brown coarse sand some cobble, some gravel, wet	SP	Y	PID 0.4 0.5
20				17-19: Brown-gray gravelly sand some cobble, slight odor 19-20: Brown gravelly sand, some cobble, wet 20.5 = end of boring. bedrock at approx 20.3'			PID= 0.4 0.3

Notes

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Page 1 of 1

Boring: SB-456

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	olin
Boring:	SB-457
File No.:	

Contractor:	Boart Longyear	Drilling Method:	RotoSonic
Operator:	Greg Haliday	Bore Hole ID/OD:	6" OD
Logged By:	~~Jerry Rawcliffe~~ Dave Chapman / CTS / JG	Auger ID/OD:	4 7/8 OD inner casing / 6" OD outer casing
Checked By:	CTH	Sampler:	Mark Maggiore
Date Start/Finish:	9/11/09 / 9/14	Hammer Wt./ Fall:	NA
Boring Location:	Area 2	Water Level[3]:	approx 10' from observation
Ref. Elevation[1]:			

Definitions:
- S = Split Spoon Sample
- U = Thin Wall Tube Sample
- R = Rock Core Sample
- V = Insitu Vane Shear Test
- q_u = Unconfined Compressive Strength (psf)
- woh = weight of 140 lb. hammer
- wor = weight of rods
- wc = Water Content, percent
- oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0-5	Run #1 (0-5) OC-SB-457-0.0/1	3.5 2-xxx	13:05 13:10	0-0.4: concrete 0.4-2: Brown-dark brown med sand. some fines, moist. 2-3: Tan med sand, some fines, moist 3-5: tan med-coarse sand, some fines moist	SP	Y	PID: 0.2 0.3
5-10	Run #2 (5-10) OC-SB-457-8-?/10.0	3.9 -xxx	13:15 13:20	~~5-6~~ 5-6: Dark brown-tan gravelly medium sand, some cobble, moist, some fines some rock frags. ~~7-9~~ 6-9: Tan med sand, some gravel, some cobble, moist, concrete frags	SP	Y	PID: 0.3 0.2 0.4
	9/14/09			~~4-5~~ 9-10: Brown-dark brown gravelly sand some cobbles 3-5" max, damp, possible innactive pipe frags at 4.5	SP		
10-15	Run #3 (10-15)	1.4	10:10	10-15: Brown-dark brown gravelly sand, coarse-med, saturated, some cobble	SP	N	PID: 0.1 0.2
15-20	Run #4 (15-20)	4.2	10:45	15-19: Brown-gray brown coarse sand. some gravel, some cobble 2" max. wet 19-20: Brown-reddish brown medium sand, some coarse, wet, uniform	SP		PID: 0.1 0.0 0.1
20-25	Run #5 (20-25)	3.0	11:00	20-25: Brown medium sand, some coarse, some fines, uniform, wet	SP		PID 0.1 0.1

Notes

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[signature]

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: olin

Boring:
File No.: SB-457

Contractor: Boart Longyear	Drilling Method: RotoSonic
Operator: Greg Haliday	Bore Hole ID/OD: 6" OD
Logged By: ~~Jerry Rawcliffe~~ David Chapman/CSI/US	Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Checked By: DM	Sampler: Jerry Rawcliffe
Date Start/Finish: 9/11/09 - 9/14	Hammer Wt./ Fall: NA
Boring Location: Area 2	Water Level[3]: approx 10' from observation
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
25	Run #6 (25-30)	2.7	11:25	25-27: Brown - dark brown coarse sand some gravel, wet			
1	OC-SB-457-2830-XXX		11:30				PID:
30				27-30: Brown - dark brown gravelly coarse sand, some cobbles 3" max. wet	SP		0.1
							0.2

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: SB-457

MACTEC

Project: Olin Chemical Superfund S
Location: Wilmington,
Client:

Boring: SB-458
File No.:

Contractor: Boart longyear
Operator: Greg Hallden
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 8/31/09
Boring Location: Area 3
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4"/8" OD inner casing/6" OD outer casing
Sampler: Mare Maggiore
Hammer Wt./ Fall: NA
Water Level[3]: ≈6' BGS based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	2.8	1525	0-0.5 Olive gray fine to coarse sand with some silt. Very moist to wet. on top of a layer of geofabric. PID=0.2		Yes	
	DC-SB-458-0/1.5-xxx	xxx	1530	0.5-1.0 Broken up asphalt & brick. =0.1			
5				1-4 Brown to dark brown fine to medium sand with a little gravel and a trace of silt. Very moist. =0.4	SP/SW		
				4-5 Brown to dark brown fine to medium sand. Very moist.	SP		
	Run#2 5-10	4.5	1530	5-6' Dark brown to black fine to medium sand with a little coarse sand and a trace of gravel. Some organic material with a thin (10mm) layer at 6" PID=1.0 =0.2		Yes	
	DC-SB-458-5/7-xxx	xxx	1545	6-7 Brown to light reddish brown fine to medium sand with traces of coarse sand, ~~and silt~~ (R) wet. =0			
10				7-10 Brown to light brown fine to medium sand with a trace of coarse sand. Wet, no unusual odors. =0 =0.1	SP		
	Run#3 10-15	4.6	1540	10-12' Brown to light brown fine to medium sand. Wet. PID=0	SP		
				12-13' light brown to olive gray fine to medium sand with a trace of silt. Wet stratified with silt along some thin layers. Wet. =0			
15				13-15 Brown fine to medium sand. Wet, massive. No unusual odors. =0.1 =0	SP		

Notes

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Jerry Rawcliffe

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	

Boring: SB-458
File No.:

Contractor:	Boart Longyear	Drilling Method:	Roto Sonic
Operator:	Greg Halliday	Bore Hole ID/OD:	6" OD
Logged By:	Jerry Rawcliffe	Casing / Auger ID/OD:	4 7/8 OD inner casing / 6" OD outer casing
Checked By:	CTM	Sampler:	Marc Maggiore
Date Start/Finish:	8/31/09	Hammer Wt./ Fall:	NA
Boring Location:	Area 3	Water Level³:	≈6' BGS based on soils.
Ref. Elevation¹:			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	4.3	1600	15 - 18.5 Brown to light brown medium sand with traces of coarse PID = 0 SSTL 18.5 - 19 light brown to with a little medium with thin dark gray layers 1-3 mm. =0	SP		
20				19 - 20 Brown to sand with a little massive. No unu			
	Run #5 20-26	4.5	1625	20 - 21.5 Brown to light olive brown fine to coarse sand with a trace of gravel. Wet. uniform. PID = 0 21.5 - 23 Olive to grayish brown fine to coarse sand and gravel with traces of cobbles. =0	W/G		
25	OC-SB-458-22/24	-XXX	1630	Wet. wide range of grain size. 23 - 24.0 Brown to olive sand with traces of coarse Wet uniform. =0.1	S		
				24.0 - 24.5 Olive brown to olive gray fine to coarse sand and gravel with a trace of silt + cobbles. Wet. No unusual odors. 24.5 - 26 Gravel and cobble sized rock fragments	GM		
30				in gray silty fine to coarse sand pulverized rock. Wet. Estimate top of rock = 24.5 BGS Bottom of boring = 26' BGS.			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Boring: SB-458

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client:

Boring: SB-459.
File No.:

Contractor: Boart Longyear
Operator: John Coughlin
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 9/3/09
Boring Location: Area 2
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4"/8" OD inner casing/6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 7-8' BGS Based on soils observations

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	4.5	1105	0-0.2 Asphalt			
	OC-SB-459-0/10-XX	XX	1110	0.2-1.8 Dark brown to brown fine to medium sand with some coarse sand and gravel. (Pavement subgrade.) Moist, masonry, organic odor. PID=590 ≥78 ≥18	SW	Yes	
				1.8-3 Brown fine to medium sand with a trace of coarse sand and silt. Moist, masonry	SP		
5				3-3.3 Very dark brown fine to medium sand with organic debris (wood fragments/well decomposed). ≥72			
				3.3-5 Brown to slightly reddish brown fine to medium sand with a trace to a little silt. Moist ≥88	SP		
	Run#2 5-10	4.2	1110	5-6.5 Brown to dark brown fine to medium sand with traces of silt. Very moist to wet, stratified, organic odor. PID=170	SP		
	OC-SB-459-6/8-XX	XX	1130	6.5-8 Olive gray to light olive brown fine to medium sand with traces of coarse sand and silt. Wet, stratified, slight organic odor. ≥120 ≥3.2	SP	Yes	
10				8-8.5 Very dark gray to black fine to medium sand with a little to traces of coarse sand.			
				8.5-10 Dark olive to dark olive gray stratified fine to medium sand with trace of coarse sand. Wet ≥8.1	SP		
	Run#3 10-15	4.3	1120	10-11 Olive gray to reddish brown to dark olive gray to dark gray fine to medium sand. Wet. PID=0.7	SP		
				11-12 Dark reddish brown with reddish mottled areas. Fine to medium sand with a trace of silt. ≥0.4			
				12-13 Olive brown medium to coarse sand with gravel and fine sand. Wet ≥0.6	SW		
15				13-15 Strong reddish brown coarse sand and gravel with some fine to medium sand. Wet. ≥0.2	SW/GW		
				Slight unusual odor at top of interval - Bottom of interval no unusual odors detected. ≥0.4			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client:

Boring: SB-459
File No.:

Contractor: Boart Longyear
Operator: John Conglin
Logged By: Jerry Rawcliffe
Checked By: GTH
Date Start/Finish: 9/3/09
Boring Location: Area 2
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: @ 7-8' Based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	4.0	1155	15-16 Olive brown to slightly reddish brown fine to coarse sand. Wet. PID=0.3	SP		
				16-20' Brown to reddish brown coarse sand and gravel with some medium and fine sand. Wet. 20.8	GW/SW		
				massive.			
				No unusual odors detected. 21.1			
				20.1			
20				20.3			
	Run #5 20-25	3.8	1205	20-20.8 Brown to reddish brown coarse sand and gravel with some medium to fine sand. Wet. PID=0.2	GW/SW		
				20.8-22.5 Strong reddish brown to very dark reddish brown coarse sand with gravel and some medium to fine sand. 20.4			
				20.1	SW		
				22.5-23 light reddish brown fine to medium sand with a little coarse sand and traces of gravel 20.2	SP		
				23-25 Reddish brown medium to coarse sand with some fine sand and gravel. Wet. 20.3	SW		
25							
	Run #6 25-30	4.6	1215	25-27 Reddish brown medium to coarse sand and gravel with a little fine sand. PID=0.2			
				27-28 Olive to olive brown fine to medium sand with gravel and cobbles with some silt 20.4	GW		
	OC-SB-459-2628-XXX		1225	20.2		Yes	
				28-30 light gray pulverized rock with cobbles and gravel. 20.5			
				Estimate top of rock = 28' BGS			
30				Bottom of boring = 30' BGS			

Notes

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Jerry Rawcliffe

Boring: SB-459

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-459**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: John Gralia	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/3/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 2	**Water Level: 7-8' bgs based on soils observations**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	4.5	1105	0-0.2' Asphalt				
	OC-SB-459-0/1.0-XXX		1110	0-1.8' Dark brown to brown fine to medium sand with some coarse sand and gravel (pavement sub grade). Moist, massive, organic odor.	590	SW	YES	
				1.8-3' Brown fine to medium sand with a trace of coarse sand and silt. Moist, massive.	78	SP		
				3-3.3' Very dark brown fine to medium sand and organic debris (wood fragments well decomposed).	18			
				3.3-5' Brown to slightly reddish brown fine to medium sand with a trace to a little silt. Moist.	72	SP		
5					88			
	Run #2 5 - 10	4.2	1110	5-6.5' Brown to dark brown fine to medium sand with traces of silt. Very moist to wet, stratified, organic odor.	170	SP		
							YES	
	OC-SB-459-6/8-XXX		1130	6.5-8' Olive gray to light olive brown fine to medium sand with traces of coarse sand and silt. Wet, stratified, slight organic odor.	120	SP		
				8-8.5' Very dark gray to black fine to medium sand with a little to traces of coarse.	3.2	SP		
				8.5-10' Dark olive to dark olive gray stratified fine to medium sand with a trace of coarse sand. Wet.	8.1	SP		
10								
	Run #3 10 - 15	4.3	1120	10-11' Olive gray to reddish brown to dark olive gray to dark gray fine to medium sand. Wet.	0.7	SP		
				11-12' Dark reddish brown with reddish rust colored areas, fine to medium sand with a trace of silt.	0.4			
				12-13' Olive brown medium to coarse sand with gravel and fine sand. Wet.		SW		
				13-15' Strong reddish brown coarse sand and gravel with some fine to medium sand. Wet.	0.6			
				Slight unusual odor at top of interval, - bottom of interval no unusual odors detected.	0.2	SW/GW		
15					0.4			

Notes

Jerry K. Rawcliffe

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MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-459**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: John Gralia	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/3/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 2	**Water Level: 6.5' bgs measured in borehole**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	4.0	1155	15-16' Olive brown to slightly reddish brown fine to coarse. Wet.	0.3	SP		
					0.8			
				16-20' Brown to reddish brown coarse sand and gravel with some medium and fine sand . Wet, massive.	1.1	GW/SW		
				No unusual odors detected.	0.1			
20					0.3			
	Run #5 20 - 25	3.8	1205	20-20.8' Brown to reddish brown coarse sand and gravel with some medium to fine sand. Wet.	0.2	GW/SW		
					0.4			
				20.8-22.5' Strong reddish brown to very dark reddish brown coarse sand with gravel and some medium to fine sand.	0.1	SW		
				22.5-23' Light reddish brown fine to medium sand with a little coarse sand and traces of gravel.	0.2	SP		
				23-25' Reddish brown medium to coarse sand and gravel with a little fine sand . Wet.	0.3	SW		
25								
	Run #6 25 - 30	4.6	1215	25-27' Reddish brown medium to coarse sand and gravel with a little fine sand.	0.2			
					0.4	GM		
	OC-SB-459-26/28-XXX		1225	27-28' Olive to olive brown fine to medium sand with gravel and cobbles with some silt.			YES	
					0.2			
				28-30' Light gray pulverized rock with cobbles and gravel. Estimate top of rock = 28' bgs.	0.5			
				Bottom of boring = 30' bgs.				

Notes

Jerry K. Rawcliffe

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MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-460
File No.:

Contractor: Boart longyear
Operator: Greg Stallings
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 9/1/09
Boring Location: Area 3
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 6.5 - 7.5' BGS based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	3.3	0630	0-1 Olive gray fine to coarse sand and gravel with traces of silt. Very moist soil treatment area). PID = 0	SW		
			0635				
			0640				
	DC-SB-460-0/1.0-xxx		0641	1-2 light gray to white pulverized concrete (remnants of concrete slab).		Yes	
5				2-2.5 light brown fine to coarse sand and gravel with a little silt. (Slab subgrade). =0.1 2.5-5 Brown to dark brown fine to medium sand =0.3 Moist, massive, uniform. No unusual odors. =0.7	SW SP		
	Run#2 5-10	4.0	0840	5-5.5 Dark brown to black fine to medium sand with traces of silt and organic material (root fibers) very decomposed. traces of coarse sand and gravel. PID = 0.4			
	DC-SB-460-5.5-7.5		0850	5.5-6.5 Brown to slightly reddish brown fine to medium sand with a trace of silt. Very moist =0.2	SP	Yes	
10				6.5-10 Brown to light brown fine to medium sand with traces of silt and coarse sand. Very moist to wet. Some stratification with coarser and finer grained layers. No unusual odors. =0.1 =0.2			
	Run#3 10-15	3.9	0850	10-11 light brown fine to medium sand with traces of silt. Wet, uniform. Some dark grayish staining. PID = 0 11-12 Dark gray to black fine to medium sand wet. Appears to be natural organic staining. =0.1	SP		
15				12-13 Brown to slightly reddish brown fine to medium sand Wet, stratified appearance. No unusual odors. 13-15 light brown fine to medium sand. Wet uniform, no unusual odors.			

Notes: Collected 0-1' sample from beneath remains of concrete slab
Collected 5.5-7.5' from organic layer and just below it.
Collected 30-32 from sands over bedrock with faint ammonia-like odor

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Boring: SB-460

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-460
File No.:

Contractor: Beard long years
Operator: Greg Halliday
Logged By: Terry Rawcliffe
Checked By: CTM
Date Start/Finish: 9/1/09
Boring Location: Area 3
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4"&OD inner casing/6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 6.5 - 7.5' BGS based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive
wob = weight of 140 lb. hamm
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	4.4	0910	15-15.8 light brown to light olive brown fine to medium sand with traces of coarse sand. Wet. PID=0.1	SP		
				15.8-17' Olive gray to gray to dark grayish brown fine to medium sand with traces of silt. Wet, slight stratified appearance. =0.2			
20				17-20 Brown to light b fine medium sand with traces of silt Wet No unusual odors detected.	SP		
	Run #5 20-25	5.2	0930	20-23.3 Olive brown to dark fine to medium sand with Wet, uniform, no apparent str No unusual odors	SP		
25	Run #6 25-30	4.4	0950	23.3-25 Brown to dark gray to light olive brown fine to coarse sand and gravel with a little cobbles and silt. Wet, massive, wide range of grain size. No unusual odors =0.2 =0.1	GW		
				25-26 Dark gray fine to coarse sand, gravel and cobbles with a little silt. Wet, massive. PID=0.2 =0.1	GW/GM		
30				26-30 Olive to olive brown fine to coarse sand and gravel with cobbles and a little silt. Wet, wide range of grain size, Massive. Very faint, unidentifiable odors. (pH on drilling water spoils = 6 7) =0.2	GW/GM		

Notes

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Terry Rawcliffe

MACTEC

Project: Olin Chemical Superfund S
Location: Wilmington,
Client:

Boring: SB-460
File No.:

Contractor: Boart longyear
Operator: Greg Hollady
Logged By: Jerry Rawcliffe
Checked By: KTM
Date Start/Finish: 9/1/09
Boring Location: Area 3
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing/6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 6.5-7.5' BGS based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
30	Run # 7 30-33.5	3.2	1035	~~Boulder~~ 30-32 Dark olive to dark olive gray fine to coarse sand and gravel with trace of cobbles and silt. PID=0.2	GW	Yes	
	OC-SB-460-30/32-GW		1040	32-32.5 Dark olive gray to dark gray fine to coarse sand and gravel with some silt and traces of cobbles. Wet, massive. Faint Ammonia-like odor. 20.3	GM		
35				32.5-33.5 Dark gray to light gray gravel with cobbles and fine to coarse sand and silt (weathered broken up rock). 20.3			
				Estimate top of rock = 32.5' BGS Bottom of boring = 33.5' BGS			

Notes

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Jerry Rawcliffe

Boring: SB-460

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-460**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/1/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 3	**Water Level: 6.5-7.5' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	3.3	830	0-1' Olive gray fine to coarse sand and gravel with traces of silt. Very moist. (Fill from soil treatment area).	0	SW		
				1-2' Light gray to white pulverized concrete. (Remnants of concrete slab).	0.1			
	OC-SB-460-0/1.0-XXX		840	2-2.5' Light brown fine to coarse sand and gravel with a little silt. (Slab sub grade).	0.1		YES	
				2.5-5' Brown to dark brown fine to medium sand . Moist, massive , uniform.	0.3	SW		
5				No unusual odors .	0.7	SP		
	Run #2 5 - 10	4.0	840	5-5.5' Dark brown to black fine to medium sand with traces of silt and organic material (root fibers) very decomposed. Traces of coarse sand and gravel.	0.4			
				5.5-6.5' Brown to slightly reddish brown fine to medium sand with a trace of silt. Very moist.	0.2	SP	YES	
	OC-SB-460-5.5/7.5-XXX		850	6.5-10' Brown to light brown fine to medium sand with traces of silt and coarse sand. Very moist to wet, some stratification with coarser and finer grained layers.	0.1	SP		
10				No unusual odors.	0.2			
	Run #3 10 - 15	3.9	850	10-11' Light brown fine to medium sand with traces of coarse sand along some layers and traces of silt. Wet, uniform. Some dark grayish staining.	0	SP		
				11-12' Dark gray to black fine to medium sand . Wet. Appears to be natural organic staining.	0.1			
				12-13' Brown to slightly reddish brown fine to medium sand. Wet, stratified appearance. No unusual odors.	0.1	SP		
				13-15' Light brown fine to medium sand. Wet, uniform, no unusual odors.	0			
15					0.1			

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-460**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/1/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 3	**Water Level: 6.5-7.5' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	4.4	910	15-15.8' Light brown to light olive brown fine to medium sand with traces of coarse sand. Wet.	0.1	SP		
				15.8-17' Olive gray to gray to dark grayish brown fine to medium sand with traces of silt. Wet, slight stratified appearance.	0.2			
				17-20' Brown to light brown fine to medium sand with a trace of silt. Wet, massive.	0.3	SP		
20				No unusual odors detected.	0.3			
	Run #5 20 - 25	5.2	930	20-23.3' Olive brown to dark olive brown fine to medium sand with traces of coarse sand . Wet, uniform , no apparent structure. No unusual odors.	0.1	SP		
					0.2			
				23.3-25' Brown to dark gray to light olive brown fine to coarse sand and gravel with a little cobbles and silt. Wet, massive, wide range of grain size.	0.2	GW		
25				No unusual odors detected.	0.1			
	Run #6 25 - 30	4.4	950	25-26' Dark gray fine to coarse sand, gravel, and cobbles with a little silt. Wet, massive.	0.2	GW/GM		
					0.1			
				26-30' Olive to olive brown fine to coarse sand and gravel with cobbles and a little silt. Wet, wide range of grain size, massive. Very faint unidentifiable odor (pH on drilling water spoils = 6-7)	0.2	GW/GM		
30					0.2			

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: SB-460
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/1/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 3	**Water Level: 6.5-7.5' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
30	Run #7 30 - 33.5	3.2	1035	30-32' Dark olive to dark olive gray fine to coarse sand and gravel with traces of cobbles and silt.	0.1		YES	
	OC-SB-460-30/32-XXX		1040	32-32.5' Dark olive gray to dark gray fine to coarse sand and gravel with some silt and traces cobbles. Wet, massive, faint ammonia-like odor.	0.2	GW/GM		
				32.5-33.5' Dark gray to light gray gravel with cobbles and fine to coarse sand and silt. (weathered broken up rock).				
					0			
				Estimate top of rock = 32.5' bgs.				
35				Bottom of boring = 33.5' bgs.	0.4			
					0			
					0.1			
					0			
40					0.4			
45								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: SB-460

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client:

Boring: SB-461
File No.:

Contractor: Boart Longyear
Operator: Greg Wallidy
Logged By: Jerry Rawcliffe
Checked By: CRM
Date Start/Finish: 9/3/09
Boring Location: Area 2
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ≈ 6' BGS based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	4.3	1415	0-0.1 Asphalt with poly liner underneath. PID=0			
	OC-SB-461-0/1.0-XXX		1420	0.1-0.7 Dark brown fine to medium sand with some coarse sand and gravel. Moist, pieces of asphalt. No unusual odors detected ≈0.1	SW	Yes	
5				0.7-2.5 Brown to slightly reddish brown fine to medium sand with a trace of silt. Moist, uniform. ≈0 ≈0.1	SP		
	Run #2 5-10	5.0	1420	2.5-5.0 Brown to light brown fine to medium sand with a trace of silt. Moist. No unusual odors. ≈0.2			
	OC-SB-461-5/7-XXX		1430	5-7.5 Brown fine to medium sand with a trace of coarse sand and silt. Wet, slightly stratified some reddish stained layers (7-7.5' BGS) PID=0.2 ≈0.1 No unusual odors detected.	SP	Yes	
10				7.5-9.5 Brown to olive brown coarse sand and gravel with some fine to medium sand and lenses of cobbles and silt ≈0 ≈0.3	SW/GW		
				9.5-10 Reddish brown coarse sand and gravel with a little medium to fine sand. Wet ≈0.2	SW		
	Run #3 10-15	4.7	1440	10-11 Brown to light reddish brown coarse sand with some medium sand and gravel lenses of small cobbles.	SW/GW		
				11-11.4 Dark reddish brown coarse sand with some medium sand and gravel. No unusual odors detected PID=0.2	SW		
15				11.4-12.5 Brown to light reddish brown coarse sand with some medium sand. Wet. PID=0.3	SW		
				12.5-15 Brown to reddish brown to olive gray fine to medium sand with a little of coarse sand and silt. Stratified with some coarse gravel layers. Reddish stained ≈0.2	SP		

Notes

layers at ≈ 12.5' and 13.5'. Gray silty layer at ≈ 14-14.1' BGS Wet.

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC	Project: Olin Chemical Superfund Site Location: Wilmington, MA. Client:	Boring: SB-461 File No.:

Contractor: Boart Longyear	Drilling Method: RotoSonic	**Definitions:** S = Split Spoon Sample U = Thin Wall Tube Sample R = Rock Core Sample V = Insitu Vane Shear Test q_u = Unconfined Compressive Strength (psf) woh = weight of 140 lb. hammer wor = weight of rods wc = Water Content, percent oc = Organic Content, percent
Operator: Greg Halliday	Bore Hole ID/OD: 6" OD	
Logged By: Jerry Rawcliffe	~~Auger~~ Casing ID/OD: 4 7/8 OD inner casing / 6" OD outer casing	
Checked By: CTM	Sampler: Dave Chapman	
Date Start/Finish: 9/3/09	Hammer Wt./ Fall: NA	
Boring Location: Area 2	Water Level[3]: 26' BGS based on soils	
Ref. Elevation[1]:		

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	3.9	1610	15-17 Brown fine to medium sand with traces of coarse sand. Wet, no unusual odors detected. PID=0.2	SP		
				17-20 Brown to light brown fine to medium sand with a trace of coarse sand and gravel and a trace of silt. Wet, slight stratification with coarser grained layers and some reddish stained areas (≈17.5-18' BGS). Some silty areas near bottom of interval. No unusual odors detected. ≈0.1 ≈0.2 ≈0.8 ≈0.2	SW		
20	Run #5 20-25	4.6	1625	20-23 Light brown to brown fine to coarse sand with a trace of gravel. Wet. Some crude stratification. No unusual odors. PID≈0.1 ≈0	SW/SP		
				23-24 Brown to light brown fine sand with some medium sand and a little silt. Wet. ≈0.2	SP		
				24-25 Brown medium to coarse sand with a little fine sand and gravel. No unusual odors. ≈0 ≈0.1	SP/SW		
25	Run #6 25-30	5.0	1645	25-28.5 Brown medium to coarse sand with some gravel and fine sand. Wet, massive. No ~~odors~~ unusual odors detected. PID=0.2 ≈0.1	SP		
				28.5-30 Olive brown to brown fine to coarse sand and gravel with a little cobbles and a trace of silt. Wet, massive. ≈0.2	GW		
	OC-SB-461-28/30	-xxx	1650	≈0.2 ≈0.3		Yes	
30							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Page 2 of 3

Boring: SB-461

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client:

Boring: SB-461
File No.:

Contractor: Boart longyear
Operator: Greg Hemsley
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 9/3/09
Boring Location: Area 2
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ≈ 26' BGS Basalom soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification		Unified Classification	Analytical Collected (Y/N)	Elevation
30	Run #7 30-35	5.1	1705	30-33 Olive to brown to dye brown fine to coarse sand and gravel with some cobbles.	20.1	SW/GW		
				Wet, some stratification of color changes,	20.1			
				33-33.5 Brown fine to medium sand with little coarse sand and gravel	20.2	SW/SP		
				33.5-34 Olive brown fine to coarse sand and gravel with a little silt and cobbles	20.4	GW/GM		
35				34-35 Recovered a couple small cobbles.	20.7			
				Estimate top of rock = 34' BGS				
				Bottom of boring = 35' BGS.				
40								

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-461**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/3/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 2	**Water Level: ~6' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	4.3	1415	0-0.1' Asphalt with poly liner underneath.				
	OC-SB-461-0/1.0-XXX		1420		0		YES	
				0.1-0.7' Dark brown fine to medium sand with some coarse sand and gravel. Moist, pieces of asphalt. No unusual odors.				
					0.1	SW		
				0.7-2.5' Brown to slightly reddish brown fine to medium sand with a trace of silt. Moist, uniform.	0.1			
						SP		
				2.5-5' Brown to light brown fine to medium sand with a trace of silt. Moist.	0.1			
5				No unusual odors .	0.2			
	Run #2 5 - 10	5.0	1420	5-7.5' Brown fine to medium sand with a trace of coarse sand and silt. Wet, slightly stratified with some slightly reddish stained layers (7-7.5').	0.2			
						SP	YES	
	OC-SB-461-5/7-XXX		1430					
			850	No unusual odors detected.	0.1			
				7.5-9.5' Brown to olive brown coarse sand and gravel with some fine to medium sand and traces of cobbles and silt.	0	SW/GW		
					0.3			
				9.5-10' Reddish brown coarse sand and gravel with a little fine to medium sand. Wet.		SW		
10					0.2			
	Run #3 10 - 15	4.7	1440	10-11' Brown to light reddish brown coarse sand with some medium sand and gravel and traces of small cobbles.		SW/GW		
				11-11.4' Dark reddish brown coarse sand with some medium sand and gravel. No unusual odors detected.	0.2			
				11.4-12.5' Brown to light reddish brown coarse sand with some medium sand. Wet.		SW		
				12.5-15' Brown to reddish brown to olive gray fine to medium sand a little coarse sand and silt. Stratified with some coarse sand layers. Reddish stained layers at ~12.9' and 13.5'. Gray silty layer at ~ 14-14.1' bgs. Wet.	0.3			
						SW		
					0.2	SP		
15								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-461**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/3/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 2	**Water Level: ~6' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	3.9	1610	15-17' Brown fine to medium sand with traces of coarse sand. Wet, no unusual odors detected.	0.2	SP		
				17-20' Brown to light brown fine to medium sand with a trace of coarse sand and gravel and a trace of silt. Wet, slight stratification with coarse grained layers and some reddish stained areas (~17.5-18' bgs). Some silty areas near the bottom of the interval. No unusual odors detected.	0.1			
					0.2			
					0.8	SW		
20					0.2			
	Run #5 20 - 25	4.6	1625	20-23' Light brown to brown fine to coarse sand with a trace of gravel. Wet, some crude stratification. No unusual odors.	0.1	SW/SP		
					0.2	SP		
				23-24' Brown to light brown fine sand with some medium sand and a little silt. Wet.	0.2			
				24-25' Brown medium to coarse sand with a little fine sand and some gravel. No unusual odors.		SP/SW		
25					0.1			
	Run #6 25 - 30	5.0	1645	25-28.5' Brown medium to coarse sand with some gravel and fine sand. Wet, massive. No unusual odors detected.	0.2	SP		
					0.1			
						GW		
				28.5-30' Olive brown to brown fine to coarse sand and gravel with a little cobbles and a trace of silt. Wet, massive.	0.2			
	OC-SB-461-28/30-XXX		1650				YES	
30					0.2			

Notes

Jerry K. Rawcliffe

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MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-461**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/3/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 2	**Water Level: ~6' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
30	Run #7 30 - 35	5.1	1705	30-33' Olive to brown to olive brown fine to coarse sand and gravel with some cobbles. Wet, some stratification of color changes.	0.1	SW/GW		
				33-33.5' Brown fine to medium sand with a little coarse sand and gravel.	0.1			
				33.5-34' Olive brown fine to coarse sand and gravel with a little silt and cobbles.	0.2	SW/SP		
				34-35' Recovered a couple small cobbles.	0.4	GW/GM		
				Estimate top of rock = 34' bgs.				
35				Bottom of boring = 35' bgs.	0.7			
40								
45								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-462
File No.:

Contractor: Boart Longyear
Operator: John Coughlin
Logged By: Terry Rawcliffe (TR/DB)
Checked By: CTM
Date Start/Finish: 9/3/09
Boring Location: Area 3
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4"/8" OD inner casing/16" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ≈ 7-8' BGS Based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wsh = weight of 140 lb. hammer
wrr = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	4.1	0855	0-0.7 Dark gray fine to coarse sand and gravel with a trace of silt, moist, massive (Fill) layers of Geofabric est 0.7'			
				0.7-1.5 light gray broken up concrete slabs. PID = 0.1 ≈0.2			
	OC-SB-462-0/1.0-XXX		0900			Yes	
				1.5-4.0 Brown fine to coarse sand and gravel with traces of silt. (concrete slabs subside). Moist massive. No unusual odors. ≈0.1 ≈8.4	SW		
5				4-5 Very dark brown fine to medium sand with organic material, pieces of wood. Moist ≈25.5	Pt		
	Run #2 5-10	4.2	0905	5-5.5 Very dark brown fine to medium sand with organic debris (fine grained well decomposed) Moist to very moist, strong hcl. PID = 3.8 ≈1.7	SP	Yes	
	OC-SB-462-4/6-XXX		0910	5.5-8 light reddish brown to brown fine to medium sand with traces of silt. Very moist to wet. ≈0.4	SP		
				8-10 light brown to brown fine to medium sand with traces of silt. Very moist to wet, massive. No unusual odors. ≈0.2			
10							
	Run #3 10-15	4.5	0910	10-13 light brown fine to medium sand with traces of silt. Wet, stratified with a couple of slightly reddish brown stained layers (≈10.9 ~~11.2~~ 11.2' BGS) PID = 0.2 ≈0.3 No unusual odors detected.	SP		
				13-15 light brown to brown fine to medium sand with a trace of coarse sand and silt. Wet, stratified. One thin black stained layer ≈13.5' BGS) No unusual odors detected. ≈0 ≈0 ≈0	SP		

Notes

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Terry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-462
File No.:

Contractor: Boart longyear
Operator: John Craglia
Logged By: Jerry Rawcliffe
Checked By: CMH
Date Start/Finish: 9/3/09
Boring Location: Area 3
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ≈7-8' BGS Bascom soils -

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wsh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	4.2	0920	15-17 light brown to light olive brown fine to medium sand with traces of silt PID= 0.7	SP		
				17-17.8 light olive brown to dark greyish brown fine to coarse sand and gravel with some cobbles ≈1.4 ≈0.4	SW/GW		
				and a trace of silt. Wet			
				17.8-18.5 Reddish brown fine to coarse sand and gravel with some cobbles and trace of silt. Wet ≈0.2	GP/GW		
20				18.5-20 light reddish/yellow brown fine to coarse sand and gravel. Wet. No unusual odors detected. ≈0.1			
	Run #5 20-25	5.2	0930	20-21.5 Brown to olive brown fine to coarse sand and gravel with traces of silt. Wet PID= 1.4	GW		
				Cobbles at 21.5' No unusual odors detected. ≈0.6			
				21.5-24 Brown to olive fine to coarse sand and gravel with a little silt and cobbles. ≈0.3	GW/GW		
				24-25 Olive to olive gray fine to coarse sand and gravel with some to a little silt. Moist. ≈1.6	GW/GW		
25				massive. No unusual odors detected. ≈2.4 ≈0.8			
	Run #6 25-30	3.9	0940	25-28' Olive brown to yellowish olive brown fine to coarse sand and gravel with some silt and traces of cobbles. Wet (muddy") PID=0.2 ≈0.1	GW/GW		
				28-30 Yellowish olive brown gravel and cobbles			
				with some fine to coarse sand. Wet. ≈0.1	GP		
30				2			

Notes

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Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site Location: Wilmington, MA. Client: Olin	Boring: SB-462 File No.:	

Contractor: Boart Longyear	Drilling Method: Roto Sonic	**Definitions:** S = Split Spoon Sample U = Thin Wall Tube Sample R = Rock Core Sample V = Insitu Vane Shear Test q_u = Unconfined Compressive Strength (psf) woh = weight of 140 lb. hammer wor = weight of rods wc = Water Content, percent oc = Organic Content, percent
Operator: John Coughlin	Bore Hole ID/OD: 6" OD	
Logged By: Jerry Rundliffe	~~Auger~~ Casing ID/OD: 4 7/8 OD inner casing / 6" OD outer casing	
Checked By: CTM	Sampler: Dave Chapman	
Date Start/Finish: 9/3/09	Hammer Wt./ Fall: NA	
Boring Location: Area 3	Water Level[3]: ≈ 7-8' BGS Based on soils	
Ref. Elevation[1]:		

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
30	Run# 7 30-35	4.8	0950	30-33 Brown to olive brown fine to coarse sand and gravel with a trace of silt and cobbles. Wet, massive. PID=0.7	GW		
				0.4			
				33-34 Light olive gray to olive brown gravel with fine to coarse sand and cobbles and a little to trace of silt.		Yes	
	OC-SB-462-31/33	XXX	1015		GW/GM		
				0.1			
				34-35 Gray to light gray cobble and gravel rock fragments in rock drive. with fine to coarse sand and silt. 0.6			
				0.2			
35				Estimated top of bedrock = 34' BGS			
				Bottom of boring = 35' BGS			

Notes

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Jerry Rundliffe

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-462**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: John Graglia	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/3/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 3	**Water Level: ~7-8' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	4.1	855	0-0.7' Dark gray fine to coarse sand and gravel with a trace of silt. Moist, massive (Fill). Layers of Geofabric at 0.7' bgs.	0.1			
				0.7-1.5' Light gray broken up concrete slab.				
					0.2			
				1.5-4' Brown fine to coarse sand and gravel with traces of silt. (Concrete slab sub grade). Moist, massive, no unusual odors .				
	OC-SB-462-0/1.0-XXX		900				YES	
					0.1	SW		
				4-5' Very dark brown fine to medium sand with organic material (pieces of wood). Moist.	8.4	Pt		
5					25.5			
	Run #2 5 - 10	4.2	905	5-5.5' Very dark brown fine to medium sand with organic debris (fine grained well decomposed). Moist to very moist, stratified.	3.8		YES	
	OC-SB-462-4/6-XXX		910			SP		
				5.5-8' Light reddish brown to brown fine to medium sand with traces of silt. Very moist to wet.	1.7			
				8-10' Light brown to brown fine to medium sand with traces of silt. Very moist to wet, massive.	0.4			
						SP		
				No unusual odors.	0.2			
10								
	Run #3 10 - 15	4.5	910	10-13' Light brown fine to medium sand with traces of silt. Wet, stratified with a couple of slightly reddish brown stained layers (~10.9 and 11.2 feet bgs).	0.2			
				No unusual odors detected.		SP		
					0.3			
				13-15' Light brown to brown fine to medium sand with a trace of coarse sand and silt. Wet, stratified. One thin black stained layer at ~13.5' bgs.	0			
				No unusual odors detected.	0	SP		
15					0			

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-462**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: John Graglia	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/3/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 3	**Water Level: ~7-8' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	4.2	920	15-17' Light brown to light olive brown fine to medium sand with traces of silt.	0.7	SP		
				17-17.8' Light olive brown to dark grayish brown fine to coarse sand and gravel with some cobbles and a trace of silt. Wet.	1.4	SW/GW		
				17.8-18.5 Reddish brown fine to coarse sand and gravel with some cobbles and a trace of silt. Wet.	0.4			
20				18.5-20' Light reddish/yellow brown fine to coarse sand and gravel. Wet. No unusual odors detected.	0.2 0.1	GP/GW		
	Run #5 20 - 25	5.2	930	20-21.5' Brown to olive brown fine to coarse sand and gravel with traces of silt. Wet, cobbles at 21.5' bgs. No unusual odors detected.	1.4 0.6	GW		
				21.5-24' Brown to olive fine to coarse sand and gravel with a little silt and cobbles.	0.3 1.6	GW/GM		
25				24-25' Olive to olive gray fine to coarse sand and gravel with some to a little silt. Moist, massive. No unusual odors detected.	2.4 0.8	GW/GM		
	Run #6 25 - 30	3.9	940	25-28' Olive brown to yellowish olive brown fine to coarse sand and gravel with some silt and traces of cobbles. Wet ("muddy").	0.2 0.1	GM/GW		
				28-30' Yellowish olive brown gravel and cobbles with some fine to coarse and a trace of silt. Wet.	0.1 0.2	GP		
30								

Notes

Jerry K. Rawcliffe

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MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: SB-462
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: John Graglia	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/3/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 3	**Water Level: ~7-8' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
30	Run #7 30 - 35	4.8	950	30-33' Brown to olive brown fine to coarse sand and gravel with a trace of silt and cobbles. Wet, massive.	0.1	GW		
					0.1			
				33-34' Light olive gray to olive brown gravel with fine to coarse sand and cobbles and a little to traces of silt.				
	OC-SB-462-31/33-XXX		1015		0.2		YES	
				34-35' Gray to light gray cobble and gravel rock fragments in rock flour with fine to coarse sand and silt.		GW/GM		
					0.4			
				Estimate top of rock = 34' bgs.				
35				Bottom of boring = 35' bgs.	0.7			
40								
45								

Notes

Jerry K. Rawcliffe

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Boring: SB-462

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client:

Boring: SB-463
File No.:

Contractor: Beard Long years
Operator: Greg Halliday
Logged By: Terry Rawcliffe
Checked By: GH
Date Start/Finish: 9/1/04
Boring Location: Area 3
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: 6-7' BGS Based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	4.8	1250	0-0.8 Gray to dark gray fine to coarse sand and gravel with a little silt. Moist, (former soil treatment fill) PID = 0.1	SW		
	OC-SB-463-0/1.0-XXX		13:00	0.8-2.5 Brown to light brown fine to medium sand with some (+ coarse sand) gravel. Layer of fine to medium sand at ± 1.6-2' BGS. =0.2 =0.5			
5				2.5-5.0 Dark brown fine to medium sand with some coarse sand and gravel with traces of silt. Moist, massive, no unusual odors. =2.4	SW/SP		
	Run #2 5-10	4.9	1300	5-5.5 Dark brown fine to medium sand with with some to a little coarse sand and gravel. Very moist. No unusual odors. PID = 0.8			
	OC-SB-463-6/8-XXX		1310	5.5-7.5 Reddish/orange brown fine to medium sand with traces of coarse sand and silt. =0.3	SP		
10				Wet, some stratification with different colored layers. Green stained layer at ± 7.5' =0.2 7.5-10.0 - Brown to dark brown fine to medium sand with traces of coarse sand and silt. Wet stratified. Slight "methalic" odor. =1.9			
	Run #3 10-15	5.0	1315	10-15 Olive brown to brown to light olive gray fine to medium sand with a trace of coarse sand in some areas/layers and some silt in some areas/layers. Wet, stratified, PID = 0.1 =0			
15				uniform grain size. No unusual odors =0.1 =0.1			

Notes

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Terry Rawcliffe

Boring: SB-463

MACTEC

Project: Olin Chemical Superfund
Location: Wilmington, NC
Client:

Boring: SB-463
File No.:

Contractor: Boart Longyear
Operator: Greg Walding
Logged By: Terry Rawcliffe
Checked By: CTM
Date Start/Finish: 9/1/09
Boring Location: Area 3
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ≈6-7' BGS based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	4.9	1325	15-16 Brown to olive brown fine to medium sand with a little to a trace of coarse sand. W	SP		
				16-18.5 Brown fine to coarse sand and gravel wet, crudely stratified with finer + coarser grained areas. Wide range of grain size	GW/SW		
				18.5-20 Brown fine to coarse sand. Wet, some layering/stratification of coarser + finer grained areas. No unusual odors. ≈1.0			
20	Run #5 20-25	4.6	1350	20-21.5 Brown to olive brown fine to medium sand with traces of coarse sand and silt. Wet, uniform, stratified appearance. PID = 0.1	SP		
				21.5-24 Olive brown fine to coarse sand and gravel with silt and traces of cobbles. Wet massive - slight odor. ≈0.2	GW		
				24-25 light olive grey cobbles and gravel fine to coarse sand with some silt W ≈0.1			
25							
	Run #6 25-30	3.5	1410	25-27 light olive grey fine to coarse sand and gravel with some silt and traces of cobbles. Wet, massive PID = 0.7 ≈0.4	GW/GW		
				27-27.5 Cobbles.			
				27.5-30 Olive to olive brown fine to coarse sand and gravel with some silt and traces of cobbles. Wet, massive No unusual odors	GW/SW	Yes	
	OC-SB-463 28/30		1450				
30							

Notes

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Terry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client:

Boring: SB-463
File No.:

Contractor: Boart longyear	Drilling Method: RotoSonic
Operator: Greg Wellday	Bore Hole ID/OD: 6" OD
Logged By: Terry Rawcliffe	Auger ID/OD: 4"&OD inner casing/6" OD outer casing
Checked By: CTM	Sampler: Dave Chapman
Date Start/Finish: 9/1/09	Hammer Wt./ Fall: NA
Boring Location: Area 3	Water Level[3]: ~6-7' BGS based on soils.
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
30	Runs 7 30-32.5	2.4	1440	30-31 Olive to olive brown fine to coarse sand PID=0.4 and gravel with cobbles and a little silt. Wet massive. ~0.5 31-32 = Grey to olive grey gravel and cobbles with some fine to coarse sand and some to a little silt. Wet, ~0.3	GM GM		
35				Massive Paint ammonia-like odor. 32-32.5 Cobbles. Estimate Top of bedrock = 31' BGS Bottom of boring = 32.5' BGS			
40							
45							

Notes

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Terry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client:

Boring: SB-464
File No.:

Contractor: Boart longyear	Drilling Method: RotoSonic
Operator: Greg Halliday	Bore Hole ID/OD: 6" OD
Logged By: Terry Rawcliffe	Auger ID/OD: 4"&OD inner casing/6" OD outer casing
Checked By: CM	Sampler: Dave Chapman
Date Start/Finish: 9/1/09	Hammer Wt./ Fall: NA
Boring Location: Area 3	Water Level[3]: 6-6.5' BGS based on SB1C
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wsh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	2.5 (50%)	1545 ~~1550~~	Concrete 0-1.6			
				1.6-5.0 Brown to light reddish/orange brown fine to medium sand with traces of coarse sand and granules. Moist, massive. uniform grain size. PID=0.5	SP		
	OC-SB-464-0/1.0		1550	20.3		Yes	
				=0.4			
5				=0.3			
	Run#2 5-10	4.4	1550	5-6 Brown to light reddish brown fine to medium sand with traces of gravel and coarse sand and silt. PID=0.2	SP		
	OC-SB-464-5/7-xxx		1610	6-6.5 Light olive gray fine to medium sand with traces of gravel and coarse sand. Very moist zone. =0.4		Yes	
				6.5-8 Brown to light reddish brown fine to medium sand with a little coarse sand. Wet 20.3			
				8-9 Gray fine to medium sand with traces of coarse sand.	SP		
10				9-10 light brown fine to medium sand with traces of coarse sand, wet. No unusual odors 20.2			
	Run#3 10-15	4.5	1600	10-11.5 Gray to olive gray fine to medium sand with a little coarse sand and traces of silt. Wet, stratified PID=0.3	SP		
				Black stained layer 5-10 mm thick at ≈ 11' BGS =0.4			
				11.5-15 Brown to dark brown fine to medium sand with a little coarse sand. Wet, stratified with =0.2			
				some coarse grained areas. No unusual odors.	SP		
15				20.2			

Notes

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Terry Rawcliffe

Boring: SB-464

MACTEC

Project:	Olin Chemical Superfund
Location:	Wilmington,
Client:	

Boring: SB-464
File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic	**Definitions:**
Operator: John Graglia	Bore Hole ID/OD: 6" OD	S = Split Spoon Sample; U = Thin Wall Tube Sample; R = Rock Core Sample; V = Insitu Vane Shear Test; q_u = Unconfined Compressive; woh = weight of 140 lb. hamm; wor = weight of rods; wc = Water Content, percent; oc = Organic Content, percen
Logged By: Terry Rawcliffe	~~Auger~~ Casing ID/OD: 4 7/8 OD inner casing/6" OD outer casing	
Checked By: cfm	Sampler: Dual Chapman	
Date Start/Finish: 9/1/09	Hammer Wt./ Fall: NA	
Boring Location: Area 3	Water Level[3]: 6-6.5' BGS based on soils	
Ref. Elevation[1]:		

Depth	Sample No.	Recovery	Time	Sample Description and Classification		Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run#4 15-20	4.2	1610	15-16 Brown to light brown fine to medium sand with a little coarse sand and gravel. Wet.	D - 0.2 of	SP		
				16-17 Brown fine to coarse sand and gravel with traces of silt		SW/G		
				17-20 Olive to olive gray sand and gravel with some coarse silt. Wet, massive. No unusual odors	seed little 2	GW/W		
20	Run#5 20-25	2.2	1625	20-25 Olive to olive gray fine to coarse sand and gravel with some silt and traces of cobbles. Wet, massive, no unusual odors.	2	GM		
				(Cobble layer ≈ 25.5-2)	2			
25	~~Run#6 25-32~~ Run#6 25-32	5.6	1640	25-26.5 Olive to light olive gray fine to coarse sand and gravel with cobbles and some silt. Wet massive. No unusual odors.	PID= 2.4 22.8	GM/GW		
	OC-SB-464-26/28	-NA	1650	26.5-28 light olive brown fine to coarse sand gravel and silt. Wet, massive.	25.2		Yes	
				28-30.5 Gray to olive gray fine to coarse sand with gravel and silt. Wet, massive. No unusual odors	7.8	GM		
30				30.5-32 Cobbles and gravel in fine to coarse sand and silt (pulverized rock). Estimated top of rock = 30.5' BGS	25.4			

Notes

Bottom of Boring = 32' BGS

Slightly elevated PID reading correspond to areas where soil was warm to touch from drilling through cobbles and rock

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Jerry Rawcliffe

Page 2 of 2

Boring: SB-464

MACTEC	Project: Olin Chemical Superfund Site Location: Wilmington, MA Client: Olin	Boring: SB 465 File No.:

Contractor: Boart Longyear	Drilling Method: RotoSonic	**Definitions:**
Operator: John Coughlin	Bore Hole ID/OD: 6" OD	S = Split Spoon Sample
Logged By: Jerry Rawcliffe	Auger ID/OD: 4"/4.00 inner casing / 6" OD outer casing	U = Thin Wall Tube Sample
Checked By: CTM	Sampler: Dave Chapman	R = Rock Core Sample
Date Start/Finish: 9/2/09	Hammer Wt./ Fall: NA	V = Insitu Vane Shear Test
Boring Location: Area 3	Water Level[3]: ≈6' bgs based on soils	q_u = Unconfined Compressive Strength (psf)
Ref. Elevation[1]:		woh = weight of 140 lb. hammer wor = weight of rods wc = Water Content, percent oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run#1 0-5	2.2	0730	0-1.4' Concrete slab			
	OC-SB-465-0/1.0-xxx		0735	1.4-2.5 light brown to brown medium sand with some to a little gravel traces of cobbles. Moist. PID=0	SP/SW		
5				2.5-5 Brown fine to medium sand with traces of coarse sand and gravel. Moist, massive no unusual odors.	SP		
	Run#2 5-10	5.0	0735	5-6.5 Brown to dark brown fine to medium sand with little to traces of coarse sand, gravel and traces of cobbles. Very moist to wet, slight stratified appearance, quite uniform	SP		
10	OC-SB-465-8/10-xxx/MP xMS/MSD		0745	6.5-7.5 Dark reddish brown to reddish brown fine to medium sand with traces of coarse sand Wet, slight stratified appearance, root fibers top of interval. 7.5-10 Brown fine to medium sand with a little to a trace of coarse sand. Wet, stratified, no unusual odors	SP	Yes	
	Run#3 10-15	4.8	0745	10-11.5 Similar to 7.5-10 interval. PID=0.6 11.5-12 light reddish/orange brown fine to medium sand with traces of silt and coarse sand. Wet, well stratified with thin reddish (iron) stained layers ≈1.5 12-13.5 light brown fine to medium sand with traces of silt. Wet. ≈0.4	SP		
15				13.5-15 Brown fine to coarse sand. Wet, no apparent structure. No unusual odors. ≈0.2 ≈0.3 ≈0.2			

Notes

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Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-465
File No.:

Contractor: Boart longyear
Operator: John Geraghty
Logged By: Terry Rawcliffe
Checked By: CTM
Date Start/Finish: 9/2/09
Boring Location: Area 3
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ±6' BGS based on soils.

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	3.7	0755	15-16 Brown fine to coarse sand with some fine to coarse gravel. Wet, becomes coarser with depth. PID=0.1	SP/SW		
				16-17.8 Brown coarse sand with fine to medium sand and gravel and a little cobbles. Wet, some large scale stratification ≥0.1	GW/SW	Yes	
	OC-SB-465-15/18-XXA		0805				
20				17.8-20' light olive to olive gray fine to coarse sand and gravel with some silt and traces of cobbles. Wet, massive ≥0.1	GW/GW		
	Run #5 20-25	4.5	0805	20-24 Olive gray to slightly greenish olive gray fine to coarse sand with silt and gravel and a little cobbles. Wet, massive. PID=0.1 ≥0.1	GM		
25				24-25 Olive to olive brown fine to coarse sand and silt with gravel and traces of cobbles Wet, massive No unusual odors. ≥0			
	Run #6 25-30	3.7	0815	25-29 Olive to olive brown fine to coarse sand and gravel with a little silt and traces of cobbles. (Gravelly/cobble layer at ≈28-29'). Wet, some cross stratification. Wide range of grain sizes. PID=0.1 ≥0.1	GW/GM		
30				29-30 Olive to olive gray fine to coarse sand with some gravel and a little silt and cobbles. Wet. No unusual odors. ≥0.1			

Notes

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Terry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-465
File No.:

Contractor: Boart longyear	Drilling Method: RotoSonic
Operator: John Conglia	Bore Hole ID/OD: 6" OD
Logged By: Terry Rawcliffe	Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Checked By: CTM	Sampler: Dave Chapman
Date Start/Finish: 9/2/09	Hammer Wt./ Fall: NA
Boring Location: Area 3	Water Level[3]: ~6' BGS based on soils
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
30	Run # 7 30-34	3.5	0830	30 - 32.5 Brown to olive brown medium to coarse sand with some fine sand and gravel. Wet, massive. No unusual odor. PID = 0.2 = 0.2			
34		XXXX		32.5 - 34 Gray to dark gray fine to coarse sand and gravel with cobbles and rock fragments (Pulverized rock). Estimate top of rock = 32.5' BGS Bottom of boring = 34' BGS			

Notes
32.5-33

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Terry Rawcliffe

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-465**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: John Graglia	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/2/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 3	**Water Level: ~6' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	2.2	730	0-1.4' Concrete slab.				
	OC-SB-465-0/1.0-XXX		735		0		YES	
				1.4-2.5' Light brown to brown fine to medium sand with some to a little gravel, coarse sand , and traces of cobbles. Moist, massive.		SP/SW		
					0			
				2.5-5' Brown fine to medium sand with traces of coarse sand and gravel. Moist, massive, no unusual odors .		SP		
					0.1			
5								
	Run #2 5 - 10	5.0	735	5-6.5' Brown to dark brown fine to medium sand with little to traces of coarse sand , gravel, and traces of cobbles. Very moist to wet, slight stratified appearance, quite uniform.	0			
					0.2	SP		
				6.5-7.5' Dark reddish brown to reddish brown fine to medium sand with traces of coarse sand. Wet, slight stratified appearance, root fibers at top of interval.	0.1			
					0.3			
				7.5-10' Brown fine to medium sand with a little to a trace of coarse sand. Wet, stratified.	0.2	SP		
	OC-SB-465-8/10-XXX		745				YES	
10	DUP/XMS/MSD			No unusual odors.	0.8			
	Run #3 10 - 15	4.8	745	10-11.5' Similar to 7.5-10' interval.	0.6			
				11.5-12' Light reddish/orange brown fine to medium sand with traces of silt and coarse sand. Wet, well stratified with a thin reddish (iron) stained layers.	1.5			
					0.4	SP		
				12-13.5' Light brown fine to medium sand with traces of silt. Wet.	0.2			
				13.5-15' Brown fine to coarse sand. Wet, no apparent structure.	0.3			
15				No unusual odors.	0.2			

Notes

Jerry K. Rawcliffe

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MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-465**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: John Graglia	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/2/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 3	**Water Level: ~6' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	3.7	755	15-16' Brown fine to coarse sand with some to a little gravel. Wet, becomes coarse with depth.	0.1	SP/SW		
	OC-SB-465-16/18-XXX		825	16-17.8' Brown coarse sand with fine to medium sand and gravel and a little cobbles. Wet, some large scale stratification.	0.1	GW/SW	YES	
					0			
				17.8-20' Light olive to olive gray fine to coarse sand and gravel with some silt and traces of cobbles. Wet, massive.	0.1	GM/GW		
20					0.1			
	Run #5 20 - 25	4.5	805	20-24' Olive gray to slightly greenish olive gray fine to coarse sand and silt and gravel and a little cobbles. Wet, massive.	0.1	GM		
					0.1			
					0.1			
				24-25' Olive to olive brown fine to coarse sand and silt with gravel and traces of cobbles. Wet, massive.				
					0			
				No unusual odors.				
25					0.5			
	Run #6 25 - 30	3.7	815	25-29' Olive to olive brown fine to coarse sand and gravel with a little silt and traces of cobbles. (gravelly/cobble layer at ~28-29'). Wet, some crude stratification, wide range of grain sizes.	0.1	GW/GM		
					0.1			
				29-30' Olive to olive gray fine to coarse sand with some gravel and a little silt and cobbles. Wet.	0.1			
					0.1			
30								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: SB-465
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: John Graglia	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/2/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 3	**Water Level: ~6' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
30	Run #7 30 - 34	3.5	830	30-32.5' Brown to olive brown medium to coarse sand with some fine sand and gravel. Wet, massive. No unusual odor.	0.2			
					0.2			
				32.5-34' Gray to dark gray fine to coarse sand and gravel with cobbles and rock flour (Pulverized rock).	0.3			
				Estimate top of rock = 32.5' bgs.				
				Bottom of boring = 34' bgs.	0.5			
35								
40								
45								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: SB-465

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-466
File No.:

Contractor: Boart Longyear
Operator: Greg Hallberg
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 9/8/09
Boring Location: Area 2
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4"&OD inner casing/6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ≈ 7-8' Based on soil observations

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	3.1	1250	0-0.8 Brown fine to medium with coarse sand and some silt. PID=20.5	SW		
	OC-SB-466-6/8-XX		1755	0.8-2.5 Brown to light brown fine to medium sand, moist. ≈0.2	SP		
				2.5-5 Brown to light brown fine to medium sand with some coarse sand and gravel. Moist, massive. 20.4			
5	(OC) 5-7.5			20.6			
	Run #2 5-10		1310	5-7.5 Brown to light brown fine to coarse sand and gravel with some cobbles. Moist encountered something very firm at ≈6.5 drilled to 7.5 on rock or soil/core PID=120			5 ft
	Run #2 5-10 (2nd Attempt)		1340				
	OC-SB-466-6/8-XX		1350	Lost the rock from cobble/rock at 5-10 2nd attempt - higher brown fine to coarse sand and gravel with some silt Moist, massive. Most bottom of sample.	SW/GW	Yes	
10							
	Run #3 10-15	2.5	1410	Top of sample is olive to olive gray muddy material (fine sand with some silt and sand and gravel and silt. Poss from difficult drilling to			
				Bottom of sample is Brown coarse sand and gravel with a little cobbles and medium sand. Wet, massive ≈0.9	SW/GW/CP		
15							

Notes

Encountered refusal at ≈7.5' BGS many
2nd Attempt 5-10 - lost from drilling
at sample onground. Very cobbly coarse ma

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-466
File No.:

Contractor: Boart longyear
Operator: Greg Hallidy
Logged By: Jerry Rawcliffe
Checked By: DM
Date Start/Finish: 9/8/09
Boring Location: Area 2
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ≈ 7.8' BGS based on soil observations

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	3.4	1420	15-18' Brown to light brown coarse sand and gravel with some medium sand and traces of fine sand. Wet. PID = 0.6 ≈ 0.3	SW		
				18-20 light brown to brown fine to medium sand with a little to traces of coarse sand. Wet. No unusual odors detected. ≈ 0.3 ≈ 0.5	SP		
20	Run #5 20-25	3.5	1450	20-25' light brown medium to coarse sand with traces of fine sand and gravel. Wet slight stratified appearance. Becomes slightly finer with depth. PID = 0.4 ≈ 0.3	SP		
				≈ 0.1 ≈ 0.2			
25	Run #6 25-30	3.7	1510	25-30 light brown medium to coarse sand with a little to a trace of fine sand and gravel. Wet, massive, contains slightly more gravel at the bottom of the interval. PID = 0.3 ≈ 0.4 ≈ 0.3 ≈ 0.1	SP/SW		

Notes

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Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-466
File No.:

Contractor: Boart longyear
Operator: Greg Hall/Joey
Logged By: Jerry Rawcliffe
Checked By: JTM
Date Start/Finish: 9/8/09
Boring Location: Area 2
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Dave Chapman.
Hammer Wt./ Fall: NA
Water Level[3]: ± 7.5' BGS Based on soil observations

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
30	Run #7 30-35	2.6	1545	30-30.5 Brown to olive brown fine to coarse sand and gravel with some cobbles. Wet. PID=0.3	GM/GW	Yes	
	OC-SB-466-30/32	XXX	1550	30.5-32 Olive brown to olive to dark olive gray fine to coarse sand and gravel with a little silt and some cobbles. Wet, massive =0.4			
35				32-33 Dark olive gray fine-coarse sand and gravel becoming light gray rock fragments. =0.8			
				Estimate top of rock = 32-32.5' BGS			
				Bottom of boring = 33' BGS			
40							
45							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client:

Boring: SB-467
File No.:

Contractor: Boart Longyear	Drilling Method: RotoSonic		
Operator: Greg Halliday	Bore Hole ID/OD: 6" OD		
Logged By: Jerry Rawcliffe	Casing ~~Auger~~ ID/OD: 4"/8 OD inner casing / 6" OD outer casing		
Checked By: CTM	Sampler: Dave Chapman		
Date Start/Finish: 9/2/09	Hammer Wt./ Fall: NA		
Boring Location: Area 3	Water Level[3]: ≈ 5-6 BGS based on soils		
Ref. Elevation[1]:			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No. (Sample Information)	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	3.8	1555	0-1 Dark brown fine-medium sand with some coarse sand and a little gravel and silt. Moist, grass and root fibers. (Topsoil layer). PID = 0	SP/SW	Yes	
	OC-SB-467-0/1.0	XXX	1615	=0.1			
				1-2.5 Dark brown fine to medium sand with a little coarse sand and gravel and traces of silt. Moist, massive. (Fill?). =0.1			
				2.5-2.9 Very dark brown to ... fine sand and organic material fibers gravel well decomposed (Former Ground surface?)			
				2.9-5 Reddish brown fine to medium sand with a little to traces of silt. Very moist. =0	SP		
5	Run #2 5-10	4.9	1610	5-7.5 Brown to reddish brown fine to medium sand with a trace of coarse sand. Wet, reddish (iron) stained layers 2-10mm thick from ≈ 6-7.5' BGS. No unusual odors PID = 0.1	SP		
	OC-SB-467-6/8	XXX/DUP MS/MSD	1620	=0.1			
				7.5-10 Brown to light brown fine to medium sand with traces of coarse sand and silt. Wet, slightly stratified with some reddish (iron) stained layers. =0 =0 =0.1			
10	Run #3 10-15	4.7	1625	10-12 Brown to olive brown fine to medium sand with traces of silt. Wet. PID = 0.2	SP		
				12-15' Brown to olive brown gravel with some medium to coarse sand and traces of fine sand and cobbles. Wet, some stratification. No unusual odors. =0.4 =0.1 =0 =0	GW ~~SP~~ (JM) GP		

Notes

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Jerry Rawcliffe

Boring: SB-467

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client:

Boring: SB-467
File No.:

Contractor: Boart Longyear
Operator: Greg Halliday
Logged By: Terry Rawcliffe
Checked By: CTM
Date Start/Finish: 9/2/09
Boring Location: Area 3
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4"/8.0D inner casing/16" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ≈5-6' BGS based on soils.

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wsh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	4.7	1640	15-19 Brown to olive brown coarse sand and gravel with some fine to medium sand and cobbles - Wet, stratified gravel layers and some sand up. PID = 0.1 =0.3	GP GW/GM		
				No unusual odors. 19-20 Olive brown to ve coarse sand with some fine gravel and traces of cobbles - Wet. =0 =0.1	GW GW/GM		
20	Run #5 20-25	4.1	1655	20-21.0 Olive brown to dark brown to coarse sand. Wet. PID=0 21-25 Olive to olive brown fine to coarse sand and gravel with cobbles and some silt. Wet, massive. =0.1	GW		
				No unusual odors. =0 =0.1			
25	Run #6 25-30	3.7	1705	25-26 Brown to olive brown medium to coarse sand and gravel with a little fine sand and a trace of silt. Wet. PID = 0	SP/SW		
				26-27.5 Olive brown to yellowish olive brown Cobbles and gravel with fine to coarse sand and a little silt. Wet. No unusual odors. =0	GW		
30				27.5-30 Yellowish olive brown to olive brown coarse sand and gravel with cobbles and a little fine to medium sand and a trace of silt - Wet. becomes quite silty at bottom of interval. =0.1 =0	GP GW/M		

Notes
31-32

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Terry Rawcliffe

Boring: SB-467

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client:

Boring: SB-467
File No.:

Contractor: Boart Longyear	Drilling Method: RotoSonic
Operator: Greg Balling	Bore Hole ID/OD: 6" OD
Logged By: Jerry Rawcliffe	Auger ID/OD: 4"/8.00 inner casing/6" OD outer casing
Checked By: CRM	Sampler: Dave Chapman
Date Start/Finish: 9/2/09	Hammer Wt./ Fall: NA
Boring Location: Area 3	Water Level[3]: ≈ 5-6' Based on soils
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Runs 7 30-32	2.2	1725	30-31 Olive brown to olive fine to coarse sand POZ 0.4 and gravel with silt.			
	OC-SB-467-30/32-Rock		1730	31-32 Olive gray to gray silt fine to coarse sand gravel and cobbles (pulverized rock). 20.7			
				Estimated top of rock = 31' BGS			
				Bottom of boring = 32' BGS			

Notes

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Jerry Rawcliffe

Boring: SB-467

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-467**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/2/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 3	**Water Level: ~5-6' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	3.8	1555	0-1' Dark brown fine to medium sand with some coarse sand and a little gravel and silt. Moist, grass and root fibers. (Topsoil Loam).	0		YES	
	OC-SB-467-0/1.0-XXX		1605			SP/SW		
				1-2.5' Dark brown fine to medium sand with a little coarse sand and gravel and traces of silt. Moist, massive (Fill?).	0.1			
				2.5-2.9' Very dark brown to black fine sand and organic material (fine grained, well decomposed/ Possible former ground surface).	0.1			
5				2.9-5' Reddish brown fine to medium sand with a little to traces of silt. Very moist.	0	SP		
	Run #2 5 - 10	4.9	1610					
				5-7.5' Brown to reddish brown fine to medium sand with a trace of coarse sand. Wet, reddish (iron) stained layers 2-10mm thick from 6-7.5' bgs.	0.1	SP		
	OC-SB-467-6/8-XXX		1620	No unusual odors.	0.1		YES	
	DUP/XMS/MSD							
					0			
				7.5-10' Brown to light brown fine to medium sand with traces of coarse sand and silt. Wet, slightly stratified with some reddish (iron) stained layers.	0	SP		
10					0.1			
	Run #3 10 - 15	4.7	1625					
				10-12' Brown to olive brown fine to medium sand with traces of silt. Wet.	0.2	SP		
					0.4			
						GW		
				12-15' Brown to olive brown gravel with some medium to coarse sand, and traces of fine sand and cobbles. Wet, some stratification.	0.1			
					0			
						GP		
15				No unusual odors.	0			

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-467**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/2/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 3	**Water Level: ~5-6' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	4.7	1640	15-19' Brown to olive brown coarse sand and gravel with some fine to medium sand and cobbles. Wet, stratified with some gravel layers and some sand layers.	0.1	GP		
					0.1			
				No unusual odors.		GW/SW		
					0			
						GW		
				19-20' Olive brown to olive medium to coarse sand with some fine sand and gravel, with traces of cobbles and silt. Wet.	0.1			
20					0.1	GW/GM		
	Run #5 20 - 25	4.1	1655	20-21' Olive brown to dark brown medium to coarse sand. Wet.	0.1			
					0.1			
						GW/GM		
				21-25' Olive to olive brown fine to coarse sand and gravel with cobbles and some silt. Wet, massive.	0.1			
					0			
				No unusual odors.				
25					0.5			
	Run #6 25 - 30	3.7	1705	25-26' Brown to olive brown medium to coarse sand and gravel with a little fine sand and a trace of silt. Wet.	0.1	SP/SW		
					0.1			
				26-27.5' Olive brown to yellowish olive brown cobbles and gravel with fine to coarse sand and a little silt. Wet. No unusual odors.		GW		
					0.1	GP		
				27.5-30' Yellowish olive brown to olive brown coarse sand and gravel with cobbles and a little fine to medium sand and a trace of silt. Wet, becomes quite silty at bottom of interval.	0.1	GW/GM		
30								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-467**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/2/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 3	**Water Level: ~5-6' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
30	Run #7 30 - 32	2.2	1725	30-31' Olive brown to olive fine to coarse sand gravel with silt. Wet, massive. No unusual odor.	0.4			
	OC-SB-467-30/32-XXX		1730				YES	
				31-32' Olive gray to gray silt, fine to coarse sand, gravel and cobbles (Pulverized rock).	0.7			
				Estimate top of rock = 31' bgs.				
35				Bottom of boring = 32' bgs.				
40								
45								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: **SB-467**

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client:

Boring: SB-468
File No.:

Contractor: Boart Longyear
Operator: John Grucha
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 9/2/05
Boring Location: Area 3
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ≈ 5-6' BGS based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5ft			Concrete 0 - 1.4' then fill and another concrete slab from ≈ 2-3' BGS.			
	3-10	5.5	1002				
5	OC-SB-468-0/1.0-XXX		1005	3-4' Brown fine to coarse sand and gravel with traces of cobbles and silt (Concrete subground). PID = 0.8	SW	Yes	
	Run #2 5-10			4-5.5 Dark brown to black to dark reddish brown fine to medium sand with traces of silt and organic material. Thin black organic layer at 24.1' BGS very decomposed. Wet, some plant fibers, well stratified. ≈ 0.2 ≈ 0.2			
				5.5-10 Brown to light brown fine to medium sand with traces of coarse sand. Wet, no apparent structure, No unusual odors. ≈ 0.2 ≈ 0.8 ≈ 1.5	SP		
10	OC-SB-468-5/10-XXX		1010		SP	Yes	
	Run #2 10-15	4.9	1010	10-11 Brown fine to medium sand with traces of coarse sand PID = 0.2	SP		
				11-12 Brown to slightly reddish brown fine to medium sand with a little coarse sand and traces of gravel and a cobble - Wet ≈ 0.1	SP/SW		
				12-15 Brown medium to coarse sand with some gravel and fine sand. Wet, some stratification. Gravel layer at ≈ 13' BGS. No unusual odors. ≈ 0.2 ≈ 0 ≈ 0.2	SW SP		
15							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client:

Boring: SB-468
File No.:

Contractor: Boart Longyear
Operator: John Groulin
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 9/2/09
Boring Location: Area 3
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: Casing ID 4 7/8" OD inner casing / 6" OD outer casing
Sampler: Dave Chapman.
Hammer Wt./ Fall: NA
Water Level[3]: ≈5-6' BGS Based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run#3 15-20	3.9	1020	15-16.5 Brown fine to coarse sand; wet no apparent structure, uniform grain size. PID=0.2	SP		
				16.5-18' Brown fine to coarse sand with a little gravel. Wet, massive. ≈0.4 ≈0.8	SP/SW		
				18-20' Brown to olive brown fine to coarse sand and gravel with a little cobbles and a little to a trace of silt. No unusual odors. ≈0.9 ≈0.2 ≈0.2	GW		
20	Run#4 20-25	4.2	1030	20-22 Olive brown to olive to dark olive fine to coarse sand and gravel with a trace of silt. Wet, massive. PID=0.2 ≈0.1	GW/GM		
				22-25 Olive to dark olive gray fine to coarse sand and gravel with a little cobbles and silt. Wet, massive, no unusual odors. ≈0.2 ≈0.2	GW/GM		
25	Run#5 25-30	2.2	1035	25-27.5 Olive brown fine to coarse sand and gravel. Wet, massive. - slightly coarser with depth. PID=0 ≈0	SW/GW		
				27.5-30 Olive brown to olive coarse sand and gravel with some fine to medium sand and a trace of cobbles. Wet, massive. There is a garbage/fertilizer/manure smell but it appears to be coming from up wind (off-site) and not from the soils. ≈0.1 ≈0.1			
30							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client:

Boring: SB-468
File No.:

Contractor: Boart Longyear
Operator: John Coughlin
Logged By: Jerry Rawcliffe
Checked By: GM
Date Start/Finish: 9/2/09
Boring Location: Area 3
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4"/5" OD inner casing / 6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ≈5-6' BGS based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run# 6 30-34	4.2	1050	30-32 Olive to olive brown coarse sand and gravel with some silt. Wet. No unusual odors. PID=0 ppm ≈0.1	GW/GM	Yes	
	OC-SB-468-31/33-XXX		1100	32-33 Olive to olive gray to gray fine to medium sand with coarse sand and gravel and some silt with traces of cobbles. ≈0.3 ≈0	GM		
				33-34 Gray to dark gray cobbles and gravel and fine to coarse sand and silt (Pulverized rock)			
				Estimated top of rock ≈ 33' BGS			
				Bottom of boring = 34' BGS.			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA.
Client:	Olin

Boring: SB-469
File No.:

Contractor:	Boart Longyear	Drilling Method:	Roto Sonic
Operator:	Greg Hal...	Bore Hole ID/OD:	6" OD
Logged By:	Jerry Rawcliffe	~~Auger~~ Casing ID/OD:	4 7/8 OD inner casing / 6" OD outer casing
Checked By:	CTM	Sampler:	Dave Chapman
Date Start/Finish:	9/8/09 / 9/9/09	Hammer Wt./ Fall:	NA
Boring Location:	Area 2	Water Level[3]:	≈ 9-10' BGS based on soil observations
Ref. Elevation[1]:			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time (9/8/09)	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
9/8/09	Run #1 0-5	2.9	1710	0-0.2 Asphalt			
	OC-SB-469-0/1.0	XXX	1715	0.2-1.0 Brown fine to coarse sand and gravel with a trace of silt. Dry (pavement subgrade). PID=0.6, =0.4		Yes	
				1.0-5 Brown to light brown fine to coarse sand with some gravel and a ... of silt. Moist. Some stra... colored layers and a ... ≈2-2.5' BGS. =1.0, =0.			
5			9/9/09				
9/9/09	Run #2 5-10	3.6	0745	5-10 Brown to light brown fine to coarse sand and gravel with some cobbles and a trace of silt. Moist, massive. PID=0.4, =2.0	SW/GW		
	OC-SB-469-7/9-XXX		0750	=1.2, =0.8			
10							
	Run #3 10-15	0	~	~~Had~~ No recovery on 10-15' sample			
15							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-469
File No.:

Contractor: Boart Longyear	Drilling Method: RotoSonic
Operator: Greg Halliday	Bore Hole ID/OD: 6" OD
Logged By: Terry Rawcliffe	Auger ID/OD: 4"/8" OD inner casing/6" OD outer casing
Checked By: CTM	Sampler: Dave Chapman
Date Start/Finish: 9/8/09 - 9/9/09	Hammer Wt./ Fall: NA
Boring Location: Area 2	Water Level[3]: ≈ 9-10' BGS Based on soil observations
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	-		Had problems with casing - inner barrel jammed in outer barrel. Managed to get casing unstuck but had to pull all tools from borehole and the re-drilled. ~~to 20'~~			
		3.1	1030	PID = 0.4	SP		
20				Brown fine to medium sand grading to brown medium to coarse sand with a little fine sand and traces of gravel. Wet. PID = 0.5 = 1.1 = 1.2	SP		
	Run #5 20-25	3.4	1020	Brown to light brown medium to coarse sand with a little gravel and traces of fine sand and small cobbles. Wet, massive. PID = 0.3 = 0.1 = 0	SP/SW		
25				= 0 = 0.1			
	Run #6 25-30	3.1	1035	25-29 light brown medium to coarse sand and gravel with a little fine sand PID = 0.3	SP/SW		
				29-30 Brown to olive to light olive gray fine to coarse sand and ground with some cobbles and = 0.5			
30				a trace of silt Wet, massive	GW		
	OC-SB-469-25/30-XXX		1040			Y/OS	

Notes

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Terry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-469
File No.:

Contractor: Boart Longyear
Operator: Greg Walling
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 9/8/09 - 9/9/09
Boring Location: Area 2
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing/6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ≈ 9-10' BGS Based on soil observations

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
30	Run # 7 30-35	4.3	1050	30-32 Brown to olive brown medium to coarse sand with a little gravel and fine sand. (Possible Fill). No unusual odors. PID=0.5 =0.3			
				32-33 Olive to olive gray fine to medium sand with some coarse sand, gravel, and cobbles and a trace of silt. Wet =0.7	GW		
				33-35 light yellowish brown to olive fine to coarse sand and gravel with a little cobbles and a little to trace of silt. Wet. Boring hard at 37' =0.4 =0.1	GW/GM		
35	Run # 8 35-38	2.8	1130	Olive gray to olive fine to coarse sand with some cobbles and trace of silt. Wet PID=55 =39 =64	GW/GM		
				Paint, sweet odor. PID=140			
	OC-SB-469-36/37-Rock		1145	Encountered weathered material at ≈37' BGS Estimate top of rock 37' BGS		Yes	
40				Bottom of boring = 38' BGS			
45							

Notes

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Jerry Rawcliffe

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-469**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/8/09 - 9/9/09	**Hammer Wt./ Fall: NA**
Boring Location: Area 2	**Water Level: ~9-10' bgs based on soil observations**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5 (9/8/09)	2.9	1710	0-0.2' Asphalt.				
	OC-SB-469-0/1.0-XXX		1715		0.9		YES	
				0.2-1' Brown fine to coarse sand and gravel with a trace of silt. Dry (pavement sub grade).				
					1.0			
				1-5' Brown to light brown fine to coarse sand with some gravel and a few cobbles and traces of silt. Moist, some stratification with different colored layers and a cobble layer at 2-2.5'bgs.		SW		
					0.8			
5					0.7			
	Run #2 5 - 10 (9/9/09)	4.9	745					
					0.4			
					2.0	SW/GW		
				5-10' Brown to light brown fine to coarse sand and gravel with some cobbles and a trace of silt. Moist, massive.				
	OC-SB-469-7/9-XXX		750				YES	
					1.2			
					0.8			
10								
	Run #3 10 - 15	0.0	-	No recovery on 10 - 15' bgs sample.				
15								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: SB-469
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/8/09 - 9/9/09	**Hammer Wt./ Fall: NA**
Boring Location: Area 2	**Water Level: ~9-10' bgs based on soil observations**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	3.1	1000	Had problems with casing - inner barrel jammed in outer barrel. Managed to get casing unstuck but had to pull all tools from borehole and then redrill.	0.4	SP		
					0.8			
				15-20' Brown fine to medium sand grading to brown medium to coarse sand with a little fine sand and traces of gravel. Wet.	1.1	SP		
20					1.2			
	Run #5 20 - 25	3.9	1020		0.3			
					0.1	SP/SW		
				20-25' Brown to light brown medium to coarse sand with a little gravel and traces of fine sand and small cobbles. Wet, massive.	0			
					0			
25					0.1			
	Run #6 25 - 30	3.1	1035		0.3	SP/SW		
				25-29' Light brown medium to coarse sand and gravel with a little fine sand .	0.5			
					1.5			
				29-30' Brown to olive to light olive gray fine to coarse sand and gravel with some cobbles and a trace of silt. Wet, massive.		GW		
	OC-SB-469-28/30-XXX		1040		2.1		YES	
30								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-469**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/8/09 - 9/9/09	**Hammer Wt./ Fall: NA**
Boring Location: Area 2	**Water Level: ~9-10' bgs based on soil observations**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
30	Run #7 30 - 32	4.3	1050	30-32' Brown to olive brown medium to coarse sand with a little gravel and fine sand (Possible flow in). No unusual odor.	0.5			
				32-33' Olive to olive gray fine to medium sand with some coarse sand, gravel, and cobbles, and a trace of silt. Wet.	0.3	GW		
				33-35' Light yellowish brown to olive fine to coarse sand and gravel with a little cobbles and a little to a trace of silt. Wet. Becomes hard at 32'	0.7			
35					0.4	GW/GM		
	Run #8 35 - 38	2.8	1130	35-38' Olive gray to olive fine to coarse sand and gravel with some cobbles and traces of silt. Wet. Faint sweet odor.	0.1			
					55			
					39	GW/GM		
	OC-SB-469-36/37-XXX		1145		64		YES	
				Encountered very hard material at ~37' bgs. Estimate top of rock = 37' bgs	140			
40				Bottom of boring = 38' bgs.				
45								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: **SB-469**

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client:

Boring: SB-470
File No.:

Contractor: Boart longyear
Operator: John Geraghty
Logged By: Terry Rawcliffe
Checked By: ctm
Date Start/Finish: 9/4/09
Boring Location: Area 2
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ≈ 11.5' Based on soils.

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	4.0	1000	Concrete 0-0.8' PID 20.1			
			1015	0.8-1.8 Brown gravel with fine to coarse sand (concrete gravel).	GW	Yes	
	OC-SB-470-0/1.0-XXX		1015	1.8-4.0 Dark brown to brown fine to medium sand with coarse sand and gravel with trace of cobbles and silt. Some stratification (layers?). 20.2	SW		
				4-5' light brown fine to coarse sand with some gravel and cobbles. Dry. 20.4			
5				5-5 (#2) 20.3	SW		
	Run #2 5-10	4.3	1005	5-7 Brown gravel with fine to coarse sand PID = 1.3			
			(#3)	7.7-8.5 Brown to slightly dark brown fine to coarse sand and gravel.			
			6	8.5-9.9 Light gray fine to coarse sand and gravel with silt 21.2	SW		
				20.5			
			(#4)	9.9-10 Brown to slightly reddish brown fine to coarse sand and gravel. Moist, massive.			
	OC-SB-470-7/9-XXX		1020	9-11.5 (#5) Very light brown to gray fine to coarse sand and gravel with some silt. Dry. 20.3	SW	Yes	
10				21.2			
	Run #3 10-15	4.0	1020	10-11.5 Brown to light brown fine to coarse sand and gravel with traces of cobbles and silt. Dry, massive. PID = 0.2 20.1	SW/GW		
				11.5-15 Brown coarse sand and gravel with some medium sand and a little fine sand and cobbles. Wet. 20	GW/SW		
15				20.1			

Notes

No elevated PID readings or unusual odors detected in this boring

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Terry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-470
File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic
Operator: John Graglia	Bore Hole ID/OD: 6" OD
Logged By: Jerry Rawcliffe	Casing ID/OD: 4"/8" OD inner casing / 6" OD outer casing
Checked By: CJM	Sampler: Dave Chapman
Date Start/Finish: 9/4/19	Hammer Wt./ Fall: NA
Boring Location: Area 2	Water Level[3]: ≈11.5' Based on soils
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	5.0	~~1035~~ 1030	15-18.5' Brown to light brown coarse sand with some gravel and a little medium sand and cobbles and traces of fine sand. Wet, massive but more gravel with depth. PID ≈ 0.1, ≈0, ≈0	SW		
				18.5-20 Very light brown to light greyish brown fine to medium sand. Wet, stratified appearance. One slightly reddish brown stained layer at ≈19.5'. Becomes slightly coarser grained below stained layer. ≈0, ≈0.1	SP		
20	~~R~~ Run #5 20-25	3.9	~~1040~~ 1040	20-22 light brown to very light brown to light greyish brown fine to medium sand. Wet, slightly stratified with finer and coarser grained layers. PID ≈ 0.2, ≈0.1	SP		
				22-~~23~~.5 Very light brown to light greyish brown fine sand with a trace of silt. Wet. Bottom of interval ~~23.5-25~~ is stained reddish brown. ≈0.1			
			(20)	23.5-25 light brown medium to fine sand with a trace of coarse sand along some layers. Wet, stratified. ≈0.1	SP		
25	Run #6 25-30	4.5	1050	25-27.5 Brown to reddish brown to light brown medium to coarse sand with traces of gravel and fine sand. Wet with some reddish brown stained layers (25.5-26' + 27-27.3'). PID ≈ 0.2, ≈0, ≈0.4	SP		
30				27.5-30 Very light brown to light greyish brown fine to medium sand. Wet, stratified. ≈0.1, ≈0.2, ≈0.6	SP		

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Page 2 of 3
Boring: SB-470

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-470
File No.:

Contractor: Boart longyear
Operator: John Craglia
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 4/4/09
Boring Location: Area 2
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Dave Chiparus
Hammer Wt./ Fall: NA
Water Level[3]: ≈16.5' BGS based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
				31.5 (27)			
30	Run #7 30-35	3.5	1105	30-~~32~~ Very light brown to light greyish brown fine to medium sand. Wet, PID = 0.3	SP		
				31.5-35 Brown to olive brown to ~~brown~~ olive (27) fine to coarse sand and gravel with some cobbles and a little silt. Wet, massive. No unusual odors detected. PID 0.1	GW/GM	Yes	
	(27)						
35	~~Run #8 35-41~~	~~3.8~~	~~1120~~				
	Run #8 35-41	3.8	1120	35-37.5 Brown to olive brown to dark olive brown fine to coarse sand and gravel with silt and cobbles. Wet. Massive PID=0.2 =0.1	GM GM (27)		
				37.5-38.5 ~~light~~ grey to light grey cobbles and rock ~~fragments~~ =0			
				38.5-40' ~~Dark~~ olive brown gravel and ~~cobbles~~ with fine to coarse ~~sand and silt~~. =0.1			
40				40-41' Bedrock - but no recovery			
				Estimated top of rock = 37.5' BGS. =0.1			
				41' Bottom of boring			
45							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

37.5-41 Jerry Rawcliffe

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-470**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: John Graglia	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/4/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 2	**Water Level: ~11.5' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	4.0	1000	0-0.8' Concrete.				
				0.8-1.8' Brown gravel with fine to coarse sand (concrete sub grade).	0.1	GW		
	OC-SB-470-0/1.0-XXX		1015				YES	
				1.8-4' Dark brown to brown fine to medium sand with coarse sand and gravel with traces of cobbles and silt. Some stratification (lifts?).	0.2	SW		
					0.4			
5				4-5' Light brown fine to coarse sand with some gravel and cobbles. Dry.	0.3	SW		
	Run #2 5 - 10	4.3	1005	5-5.7' Brown gravel with fine to coarse sand.				
				5.7-6.5' Brown to slightly dark brown fine to coarse sand and gravel.	1.3	SW		
				6.5-6.9' Light gray fine to coarse sand and gravel with silt.	1.2			
				6.9-9' Brown to slightly reddish brown fine to coarse sand and gravel. Moist, massive.	0.5		YES	
	OC-SB-470-7/9-XXX		1020		0.3	SW		
				9-10' Very light brown to gray fine to coarse sand and gravel with some silt. Dry.				
10					1.2			
	Run #3 10 - 15	4.0	1020					
				10-11.5' Brown to light brown fine to coarse sand and gravel with traces of cobbles and silt. Dry, massive.	0.2	SW/GW		
					0.1			
				11.5-15' Brown coarse sand and gravel with some medium sand and a little fine sand and cobbles. Wet.		GW/SW		
					0			
					0.1			
15								

Notes

No elevated PID readings or unusual odors detected in this boring.

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-470**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: John Graglia	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/4/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 2	**Water Level: ~11.5' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	5.0	1030	15-18.5' Brown to light brown coarse sand with some gravel and a little medium sand and cobbles and traces of fine sand. Wet, massive but more gravel with depth.	0.1	SW		
					0			
				18.5-20' Very light brown to light grayish brown fine to medium sand. Wet, stratified appearance. One slightly reddish brown stained layer at ~ 19.5' bgs. Becomes slightly coarser grained below stained layer.	0			
					0	SP		
20					0.1			
	Run #5 20 - 25	3.9	1040	20-22' Light brown to very light brown to light grayish brown fine to medium sand. Wet, slightly stratified with finer and coarser grained layers.	0.2			
						SP		
				22-23.5' Very light brown to light grayish brown fine sand with a trace of silt. Wet. Bottom of interval is stained reddish brown.	0.1			
					0.1			
				23.5-25' Light brown medium to fine sand with a trace of coarse sand along some layers. Wet, stratified.		SP		
25					0.1			
	Run #6 25 - 30	4.5	1050	25-27.5' Brown to reddish brown to light brown medium to coarse sand with traces of gravel and fine sand. Wet with some reddish brown stained layers (25.5-26' and 27-27.3').	0.2			
					0	SP		
					0.4			
				27.5-30' Very light brown to light grayish brown fine to medium sand. Wet, stratified.	0.1			
						SP		
					0.2			
30					0.6			

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: SB-470
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: John Graglia	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/4/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 2	**Water Level: ~11.5' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
30	Run #7 30 - 35	3.5	1105	30-31.5' Very light brown to light grayish brown fine to medium sand. Wet.		SP		
					0.3			
	OC-SB-470-31/33-XXX		1120				YES	
				31.5-35' Brown to olive brown to olive fine to coarse sand and gravel with some cobbles and a little silt. Wet, massive.		GW/GM		
					0.1			
35				No unusual odors detected.				
	Run #8 35 - 41	3.8	1120	35-37.5' Brown to olive brown to dark olive brown fine to coarse sand and gravel with silt and cobbles. Wet, massive.	0.2	GM		
					0.1			
					0			
				37.5-38.5' Light gray cobbles and rock flour.	0.1			
				38.5-40' Dark olive brown gravel and cobbles with fine to coarse sand and silt.	0.1			
40				40-41' Bedrock - but no recovery. Estimated top of rock = 37.5' bgs Bottom of boring = 41' bgs.				
45								

Notes

Jerry K. Rawcliffe

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MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-471
File No.:

Contractor: Boart Longyear
Operator: Greg Wallace
Logged By: Terry Rawcliffe
Checked By: crh
Date Start/Finish: 9/2/09
Boring Location: Area 3
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ≈ 3' BGS based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wuh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0-5	4.2	1305	0-1.8 Brown to dark brown fine to medium sand with some coarse sand and a little gravel and silt. (Loamy topsoil.) Moist, to very moist, roots/fibers	PID=0.9 ≈0.5 SW	Yes	
	OC-SB-471-0/1.0- XXX		1315	1.8-3 Dark brown fine to medium sand with organic material and a little to trace of coarse sand and gravel. Wet, (Former sump)	≈0.2		
5	OC-SB-471-3/5- XXX			3-5 Brown fine to medium sand with a little silt. Wet, some iron stained reddish orange layers. No unusual odors.	≈0.4 SP	Yes	
	Run #2 5-10	4.1	1310	5-9 Brown fine to medium sand with trace of silt. Wet, massive becomes slightly coarser with depth.	PID=0.1 ≈0.2 SP		
10				9-10 Brown to light brown fine to medium sand with a little to a trace sand and gravel. Wet Nouns	SP/SW		
	Run #3 10-15	3.9	1320	10-11.5 Brown fine to coarse sand with some gravel, cobbles and a little to a trace of silt. Wet, massive	PID=0.3 ≈0.1		
				11.5-15 Olive brown to olive to olive gray fine to coarse sand and gravel with some silt and cobbles wet, massive.	≈0 SP/SW ≈0 GM		
15							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Terry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-471
File No.:

Contractor: Boart longyear
Operator: Greg Hallberg
Logged By: Terry Rawcliffe
Checked By: ctm
Date Start/Finish: 9/2/09
Boring Location: Area 3
Ref. Elevation[1]:

Drilling Method: Roto Sonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing/6" OD outer casing
Sampler: Dave Chapman
Hammer Wt/ Fall: NA
Water Level[3]: ~3' BGS based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psi)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	3.6	1335	15-17 Olive to dark olive fine to coarse sand and silt with gravel and traces of cobbles wet, massive. PID = 0	GM		
				17-18 light gray cobbles in fine to coarse sand and gravel. =0.1			
				18-20 Gray to olive gray fine to coarse sand and silt with some gravel and traces of cobbles. Wet, massive. =0	GM		
20				No unusual odors. =0.3 =0.1	GM		
	Run #5 20-25	3.5	1345	20-23 Gray to olive to olive gray fine to coarse sand and silt with some gravel and traces of cobbles. Wet, PID=0 =0.1	GM		
				23-25 Olive to olive gray fine to coarse sand with gravel and some silt and traces of cobbles. Wet, massive. Sample very soft and disturbed difficult to see structure if any. =0	GM/GW		
25							
	Run #6 25-30	5.2	1355	25-28.5 Olive to olive brown fine to coarse sand with some silt and gravel and traces of cobbles. Wet, massive PID = 0 =0.2	GW/GW		
	DC-SB-471-26/28	RX	1430	28.5-30 Gray to dark gray gravel and cobbles with some fine to coarse sand and silt. =0 =0.3 =0.8		Yes	
30							

Notes

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Terry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA.
Client: Olin

Boring: SB-471
File No.:

Contractor: Boart longyear
Operator: Greg Halliday
Logged By: Jerry Rawcliffe
Checked By: CTM
Date Start/Finish: 9/2/09
Boring Location: Area 3
Ref. Elevation[1]:

Drilling Method: RotoSonic
Bore Hole ID/OD: 6" OD
Auger ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: ≈ 3' BGS based on soils

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wsh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run # 7 30-34	1.5	1430	30-31 Olive gray to gray fine to coarse sand and gravel with silt. No unusual odors. PID = 1.2 31-34 Gray to light gray gravel and cobbles with fine to coarse sand and silt (rock flour). = 0.5	GW/GM		
				Estimate top of rock = 31' BGS (Top of weathered rock may be as high as 28.5' Bottom of boring = 34' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: **SB-471**
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/2/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 3	**Water Level: ~3' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
	Run #1 0 - 5	4.2	1305	0-1.8' Brown to dark brown fine to medium sand with some coarse sand and a little gravel and silt (loamy topsoil). Moist to very moist, root fibers.	0.9	SW	YES	
	OC-SB-471-0/1.0-XXX		1315					
				1.8-3' Dark brown fine to medium sand with organic material and a little to traces of coarse sand and gravel. Wet, (former swamp).	0.5			
					0.2			
				3-5' Brown fine to medium sand with a little silt. Wet, some "iron" stained reddish orange layers. No unusual odors.	0.4	SP	YES	
5	OC-SB-471-3/5-XXX							
	Run #2 5 - 10	4.1	1310		0.1	SP		
				5-9' Brown fine to medium sand with traces of silt. Wet, massive, becomes slightly coarser with depth.	0.2			
				9-10' Brown to light brown fine to medium sand with a little to a trace of coarse sand and gravel. Wet.	0	SP/SW		
10				No unusual odors.	0.2			
	Run #3 10 - 15	3.9	1320	10-11.5' Brown fine to coarse sand with some gravel, cobbles, and a little to a trace of silt. Wet, massive.	0.3	SP/SW		
					0.1			
				11.5-15' Olive brown to olive to olive gray fine to coarse sand and gravel with some silt and cobbles. Wet, massive.	0			
					0	GM		
15					0.1			

Notes

Jerry K. Rawcliffe

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MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: SB-471
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/2/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 3	**Water Level: ~3' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15 - 20	3.6	1335	15-17' Olive to dark olive fine to coarse sand and silt with gravel and traces of cobbles. Wet, massive.	0	GM		
					0.1			
				17-18' Light gray cobbles in fine to coarse sand and gravel.				
20					0			
				18-20' Gray to olive gray fine to coarse sand and silt with some gravel and traces of cobbles. Wet, massive.	0.3	GM		
				No unusual odors.	0.1			
	Run #5 20 - 25	3.5	1345		0			
				20-23' Gray to olive to olive gray fine to coarse sand and silt with some gravel and traces of cobbles. Wet.		GM		
					0.1			
				23-25' Olive to olive gray fine to coarse sand with gravel and some silt and traces of cobbles. Wet, massive. Sample is very soft and disturbed - difficult to see any structure if any.	0	GM/GW		
25					0			
	Run #6 25 - 30	5.0	1355		0			
				25-28.5' Olive to olive brown fine to coarse sand with some silt and gravel and traces of cobbles. Wet, massive.	0.2	GM/GW		
	OC-SB-471-26/28-XXX		1430				YES	
					0			
					0.3			
				28.5-30' Gray to dark gray gravel and cobbles with some fine to coarse sand and silt.				
30					0.8			

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin
	6107090016-09

Boring: SB-471
File No.:

Contractor: Boart Longyear	**Drilling Method: RotoSonic**
Operator: Greg Halliday	**Bore Hole ID/OD: 6" OD**
Logged By: Jerry Rawcliffe	**Casing ID/OD: 4 7/8" OD inner casing/6" OD outer casing**
Checked By: CTM	**Sampler: Dave Chapman**
Date Start/Finish: 9/2/2009	**Hammer Wt./ Fall: NA**
Boring Location: Area 3	**Water Level: ~3' bgs based on soils**
Ref. Elevation:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	PID (ppm)	Unified Classification	Analytical Collected (Y/N)	Elevation
30	Run #7 30 - 34	1.5	1430	30-31' Olive gray to gray fine to coarse sand and gravel with silt.	1.2	GW/GM		
				No unusual odors.	0.5			
				31-34' Gray to light gray gravel and cobbles with fine to coarse sand and silt (rock flour).				
35				Estimate top of rock = 31' bgs. (Top of weathered rock may be as high as 28.5' bgs.) Bottom of boring = 34' bgs.				
40								
45								

Notes

Jerry K. Rawcliffe

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site	Boring: SB-472
Location: Wilmington, MA	File No.:
Client: Olin	

Contractor: Boart Longyear	Drilling Method: Roto Sonic	**Definitions:**
Operator: John Grazlin	Bore Hole ID/OD: 6" OD	S = Split Spoon Sample U = Thin Wall Tube Sample R = Rock Core Sample V = Insitu Vane Shear Test q_u = Unconfined Compressive Strength (psf) woh = weight of 140 lb. hammer wor = weight of rods wc = Water Content, percent oc = Organic Content, percent
Logged By: Terry Rawcliffe	Casing ID/OD: 4"/800 inner casing/6" OD outer casing	
Checked By: CTM	Sampler: Dave Chapman	
Date Start/Finish: 9/4/09	Hammer Wt./ Fall: NA	
Boring Location: Area 2	Water Level[3]: 7-8' BGS based on soils	
Ref. Elevation[1]:		

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	Run#1 0-5	4.2	0735	0-0.8 Dark brown fine to medium sand with a little coarse sand, gravel and silt. (Topsoil/Loam) Moist, massive, grass and root fibers. PID=0.3			
	OC-SB-472-0/1.0	xxx	0745	≥0.2		Yes	
				0.8-5 Brown to dark brown fine to coarse sand with some gravel and a little to a trace of silt and small cobbles. Moist, wide range of grain size. Appears to be fill with some stratification (lifts of fill?) Massive otherwise. ≥0 ≥0.2 ≥0.8	GW/SW		
5	Run#2 5-10	3.7	0745	5-5.5 Brown fine to coarse sand with a little gravel and silt. Very moist. PID≥0.4	GW		
				5.5-7.0 Brown fine to medium sand with some silt and traces of coarse sand and gravel ≥0.3	GM		
				7-7.5 Brown fine sand and silt with some medium sand and a trace of coarse sand ≥0.2	SM		
				7.5-8 Grayish brown to black fine to medium sand with organics, wood fragments, pieces of birch (former ground surface?) ≥0.0			
10	OC-SB-472-8/10	xxx	0755	8-10 light brown to brown fine to medium sand with a trace of silt. Very moist to wet. ≥0.7 ≥0.4	SP	Yes	
	Run#3 10-15	4.1	0755	10-13 light brown fine to medium sand with a trace of coarse sand and silt. Wet, stratified with some reddish ("iron") stained layers (2-5 mm thick) PID≥0.2			
				13-14 Brown to light reddish brown fine to medium sand with a trace of coarse sand Wet. ≥0.1 ≥0	SP		
15				14-15 Brown to olive brown fine to coarse sand with a little gravel and a trace of silt. Wet, massive ≥0.1 ≥0.3	GW/GM		

Notes

No elevated PID readings or unusual odors detected in this boring.

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Terry Rawcliffe

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington, MA
Client:	Olin

Boring: SB-472
File No.:

Contractor:	Boart Longyear	Drilling Method:	Roto Sonic
Operator:	John Coughlin	Bore Hole ID/OD:	6" OD
Logged By:	Jerry Rawcliffe	Casing ID/OD:	4 7/8 OD inner casing / 6" OD outer casing
Checked By:	CTM	Sampler:	Dave Chapman
Date Start/Finish:	9/4/09	Hammer Wt./ Fall:	NA
Boring Location:	Area 2	Water Level[3]:	7-8' BGS based on soils
Ref. Elevation[1]:			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
15	Run #4 15-20	4.5	0805	15-19.5 Brown to reddish brown coarse sand with some medium sand and gravel. Wet, some slight stratification with reddish stained layer at bottom of interval. PID=0.1, =0, =0.3	SP/GP		
				19.5-20 Brown to light brown fine to medium sand. Wet. =0.1, =0.1	SP		
20	Run #5 20-25	4.2	0815	20-21 Strong dark reddish brown coarse sand with ~~a little~~ some medium sand and gravel. Wet. (B) PID=0.2, =0.1	SP		
				21-25 Brown coarse sand and gravel with some medium sand. Wet, uniform, some crude stratification. =0.2, =0.2, =0.5	SP/GP		
25	Run #6 25-30	4.1	0830	25-27.5 Brown coarse sand and gravel with some medium sand. Wet. PID=0.1	SP/GP		
				27.5-29 Brown to light brown medium to fine sand with a little gravel and coarse sand. Wet. =0.2	SP		
				29-30 light brown to light olive brown cobbles with fine to coarse sand and silt with sand gravel. Wet. Massive =0.7, =0.3, =0.3	GW/GM		

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

33.5 Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client:

Boring: SB-472
File No.:

Contractor: Boart Longyear	Drilling Method: Roto Sonic
Operator: John Grazlia	Bore Hole ID/OD: 6" OD
Logged By: Jerry Rawcliffe	~~Auger~~ Casing ID/OD: 4 7/8 OD inner casing / 6" OD outer casing
Checked By: CTM	Sampler: Dave Chapman
Date Start/Finish: 9/4/09	Hammer Wt./ Fall: N/A
Boring Location: Area 2	Water Level[3]: 7-8' BGS based on soils
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
30	Run# 7 30-35	4.8	0845	30-32 Olive brown to olive fine to coarse sand and silt with some gravel and cobbles. Wet, wide range of grain size, massive PID=0.2	GM		
	OC-SB-472-30/32-Xdd		0850	=0.9 32-33.5 Brown to olive brown to olive gray fine to coarse sand and silt with cobbles and ~~some gravel. Wet.~~ =0.4	GM	Yes	
				33.5-35 light gray cobbles and gravel in rock flour. =0.6			
				Estimated top of rock = 33.5 BGS			
				Bottom of boring = 35' BGS			
35							
40							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

Boring: SB-472

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, MA
Client: Olin

Boring: SB-473
File No.:

Contractor: ZEBRA
Operator: Jason Fredericks
Logged By: Jerry Rawcliffe
Checked By: Chris Manolis
Date Start/Finish: 9/18/09
Boring Location: Area B
Ref. Elevation[1]:

Drilling Method: Direct Push
Bore Hole ID/OD: 1 5/8" / 2 1/2"
Auger ID/OD: NA
Sampler: Dave Chapman
Hammer Wt./ Fall: NA
Water Level[3]: N

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
	Sleeve #1 0-5	3.5	0850	0-0.8 Dark brown to black organic debris PID=0.4 roots, leaves, twigs decomposed with a trace of sand. Moist.	PT	Yes	
	OC-SB-473-0.6/1.0-XXX		0940	=0.6			
				0.8-2 Dark brown to brown fine to medium sand	SP		
				with some organic material mixed in layers. Moist, stratified becomes more sandy with depth. =2.5			
				2-5 Brown fine to medium sand with a trace of	SP		
5	OC-SB-473-4/6-XXX		0905	coarse sand, light reddish brown stained layers =0.3 BGS.		Wet	
	Sleeve #2 5-10	3.9	0855	5-9' light brown fine to medium sand PID=0		Yes	
				with a trace of coarse sand. Wet, stratified	SP		
				with some slightly coarser grained layers and =0			
				some slightly reddish stained layers.			
				9-10 Brown to dark brown fine to coarse			
				sand with a little gravel. Wet. =0.1	SP/SW		
10				=0			
	Sleeve #3 10-15	3.4	0915	10-14 Brown coarse sand and gravel with a little			
				medium sand and a trace of fine sand. PID=0	SP/GP		
				Wet, some stratification with gradation from coarse grained zones to fine grained zones.			
				14-15 light brown to light olive brown =0.1			
				fine to coarse sand and gravel with a	GW		
	OC-SB-473-13/15-XXX		0920	trace of silt. Wet. =0		Yes	
15				Refusal at 15'			

Notes

Completed a 2nd attempt to get more sample volume and again encountered refusal at ±15' BGS.
Bottom of boring = 15' BGS

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Jerry Rawcliffe

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, Mass.
Client: Olin

Boring: SB-474
File No.:

Contractor: Zebra	Drilling Method: Direct Push
Operator: Jason Frederick	Bore Hole ID/OD: —
Logged By: ~~T. Rawcliffe~~ D. Clapp	~~Auger~~ ID/OD: 1.75" ID
Checked By: CTM	Sampler: MacroCore.
Date Start/Finish: 11-18-10	Hammer Wt./ Fall: NA
Boring Location: SB-474	Water Level[3]:
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	2.6/5.0	12:40	0-0.5: Mostly brown-dark brown organics, silty soil.		PID	
	OC-SB-474-0.0/1.0-		12:45	0.5-1.2: Mostly fine-med sand brown-dark brown, wood frags		<0.1	
	xrf			1.2-1.5: Red brown silty sand		<0.1	
	@ 12:45					<0.1	
				1.5-2.6: Tan-brown med-fine sand, uniform, moist			
5'	[illegible]	3.4/5	12:55	0-0.7: Mostly tan-brown med sand, some reddish brown bands		PID	
	OC-SB-474-3.0/10-xrf			0.7-3.4: Mostly tan med-coarse sand, wet		<0.1	
	@ 13:00					<0.1	
10'						<0.1	
		2.5/5	13:10	0-2.5. Mostly med-fine brown sand, wet, uniform, some reddish brown sand from 2.3-2.5		PID	
	OC-SB-474-10.5/12.5-xrf					<0.1	
15'	@ 13:15					<0.1	
						<0.1	
				End of boring: 12.5' (refusal)			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC	Project: Olin Chemical Superfund Site Location: Wilmington. Mass. Client: Olin	Boring: SB-475 File No.:

Contractor: Zebra	Drilling Method: Direct Push	**Definitions:**
Operator: Jason Frederick	Bore Hole ID/OD: —	S = Split Spoon Sample
Logged By: ~~J. R...~~ D. Chup	~~Auger~~ ID/OD: 1.75" ID	U = Thin Wall Tube Sample
Checked By: CTM	Sampler: MacroCore	R = Rock Core Sample
Date Start/Finish: 11-18-10	Hammer Wt./ Fall: NA	V = Insitu Vane Shear Test
Boring Location: SB-475	Water Level[3]: /	q_p = Unconfined Compressive Strength (psf)
Ref. Elevation[1]:		woh = weight of 140 lb. hammer wor = weight of rods wc = Water Content, percent oc = Organic Content, percen

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0'	MC-1 0-5 OC-SB-475-0.0 (11.0-~~XXX~~) @ 11:25	2.6/5	11:20 11:25	0-0.2: Mostly brown-dark brown organic soil, roots/grass 0.2-0.4: Brown-tan fine-med sand 0.4-1.4: Brown-red brown fine-med sand		PID <0.1 <0.1 <0.1	
5'	OC-SB-475-8.0 (10-XXX / DUP) @ 11:45	3.2/5	11:40 11:45	0-0.3: Tan-brown med-coarse sand, moist, reddish brown 0.3-1.5: Same as above, coarser, moist 1.5-2.3: Brown-tan med-coarse sand, wet.		<0.1 <0.1 2136 57	
10'	[redacted]	(2.4)	~~12:10~~ ~~12:15~~	2.3-3.2: Same as above, wetter. tan-gray. strong petroleum odor			
15'		4.8/5	12:10	0-1.4: Brown-red brown-tan sand, damp, uniform 1.4-2.4: Same as above, wet, med-coarse 2.4-3.6: Same as above, saturated more red sand. petroleum odor		<0.1 150 26 10.2	
	OC-SB-475-16(18)-MS/MSD-XXX @ 12:25	2.0/5	12:20 12:25	0-2.0 Mostly dark brown-gray med-coarse sand, damp slight petroleum odor		2.1 5.6 30.2 <0.1	
20'				End of boring = 18' (refusal)			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington. Mass.
Client: Olin

Boring: SB-476
File No.:

Contractor: Zebra
Operator: Jason Frederick
Logged By: ~~T. Ramsdell~~ D. Clapp
Checked By: CTM
Date Start/Finish: 11-18-10
Boring Location: SB-476
Ref. Elevation[1]:

Drilling Method: Direct Push
Bore Hole ID/OD: —
~~Auger~~ ID/OD: 1.75" ID
Sampler: MacroCore.
Hammer Wt./ Fall: N/A
Water Level[3]: /

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	3.2/5.0	10:30	0-0.3: Mostly organic silty soil some roots/grass		PID	
	OC-SB-476-0.0/1.0-TNY			0.3-1.0: Mostly silty sand; small br-dark br band of reddish material at 0.7 (wood frag)		<0.1	
	@ 10:35					<0.1	
						<0.1	
				1.0-1.8: Mostly brown-tan fine-med sand, moist			
5'				1.8-3.2: Mostly tan med-coarse sand, uniform, some red. moist (DUP)			
	~~MC-2~~	3.3/5	10:50	0-1.1: Mostly ~~med~~ tan-brown med sand, uniform, damp		<0.1	
	OC-SB-476-8.0/10-TNY			1.1-2.5: Mostly brown-red brown fine-med sand, moist		2.2	
	@ 10:55			2.5-3.3: Mostly brown-tan med-coarse sand, strong petroleum		620	
10'						1918	
		3.3/5	11:10	odor, staining, wet.		0.2	
	OC-SB-476-13/15-TNY			0-0.7: Brown-tan med sand, uniform.		15.2	
	@ 11:15			0.7-3.3: Brown-tan med sand saturated, strong petroleum odor		3207	
15'						29	
				Refusal at ~~15~~ 15'			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: SB-476

MACTEC	Project: Olin Chemical Superfund Site Location: Wilmington, Mass. Client: Olin	Boring: SB-477 File No.:

Contractor: Zebra	Drilling Method: Direct Push
Operator: Jason Frederick	Bore Hole ID/OD: —
Logged By: ~~[illegible]~~ D Chup	~~Auger~~ ID/OD: 1.75" ID
Checked By: CTM	Sampler: MacroCore
Date Start/Finish: 11-18-10	Hammer Wt./ Fall: NA
Boring Location: SB-477	Water Level[3]: —
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	3.2/5	9:50	0-0.8: Mostly organics, br-drk brown, some roots/grass, fine soil		PID	
	OC-SB-477-0.0/1.0-XXX			0.8-1.1: Reddish-brown fine-med sand.		<0.8	
	@ 9:55			1.1-2.2: Same as above, moist		<0.1	
5'				2.2-3.2: Same as above, tan, med-coarse		<0.1	
	5-10	3.5/5	10:00	0-2.0: → Mostly brown-tan med sand, moist, uniform.		PID	
	OC-SB-477-8.0/10-XXX			2.0-2.7: Same as above, coarse, some reddish color.		<0.1	
	@ 10:10			2.7-3.5: Same as above, saturated, dark staining, shiny, strong petroleum odor		5.2	
10'	~~M[illegible]~~					4130	
	10-12.5	2.5/2.5	10:20	0-~~0.5~~ 1.5: Mostly gray, fine-med sand (24) moist, stained, sheen, strong petroleum odor		PID	
	OC-SB-477-10.5/12.5-XXX			1.5-2.1: Same as above, fine, some silt, strong odor		<0.1	
15'	@ 10:25			2.1-2.5: Coarse tan-brown sand coarse-med, some staining		1900	
				Refusal at 12.5'		<0.2	
						1.7	

Notes

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Boring: SB-477

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington. Mass.
Client: Olin

Boring: SB-478
File No.:

Contractor: Zebra	**Drilling Method:** Direct Push		
Operator: Jason Frederick	**Bore Hole ID/OD:** —		
Logged By: ~~[illegible]~~ D. Chyme	**Auger ID/OD:** 1.75" ID		
Checked By: CTM	**Sampler:** MacroCore		
Date Start/Finish: 11-18-10	**Hammer Wt./ Fall:** NA		
Boring Location: SB-478	**Water Level[3]:** N/A		
Ref. Elevation[1]:			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5 OC-SB-478-00 @ 9:10	3.2/5.0 1.0-XXX	9:05	0-0.4: Mostly brown-dark brown organics. some grass / roots 0.4-0.7: Mostly silty sand, some organics. br-dark br. 0.7-3.2: Brown-red brown-tan sand, uniform, moist		PID <0.1 <0.1 <0.1	
5'	5-12 OC-SB-478-8.0 @ 9:25	3.4/5 8.0/10-XXX	9:20	0-2.8: Mostly brown-tan med sand, moist, uniform. 2.8-3.4: Mostly same as above, damp, med-coarse		PID <0.1 <0.1 <0.1	
10'	~~MC-2~~ OC-SB-478- @ 9:45	2.0/2.0 ~~3.4/5~~ (2.0) 10/12-XXX	9:40	0-0.9: Mostly med-coarse sand tan, brown, 0.9-1.6: Med-coarse brown-tan sand. band of dark material from 1.0-1.2, moist		PID <0.1 25 4370 1080	
				1.6-2.0: Brown-tan med-coarse sand. wet, uniform, strong petroleum odor Refusal at 12'			
15'							

Notes

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MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington. Mass.
Client: Olin

Boring: SB-479
File No.:

Contractor: Zebra	Drilling Method: Direct Push
Operator: Jason Frederick	Bore Hole ID/OD: —
Logged By: J. Rawcliffe	Auger ID/OD: 1.75" ID
Checked By: CTM	Sampler: MacroCore.
Date Start/Finish: 11/16/10	Hammer Wt./ Fall: NA
Boring Location: —	Water Level[3]: —
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	3.9/5.0	1520	0-0.2 Asphalt.		0.1	
				0.2-0.8 Brown to reddish medium to coarse sand and gravel fine sand. Moist. OC 901		0.4	
						0.2	
	PIDHS			0.8-1.6 Reddish brown medium sand with a trace of fine sand and some roots fibers.		0.5	
	3-5 2.4			1.6-5.0' Brown ~~fine~~ medium sand with a little fine sand and traces of coarse sand. Moist, some stratification.		0.4	
5'	MC-2 5-10	3.3/5.0	1525	5-5.6 Brown medium sand with traces of fine sand and coarse sand. Very moist.		0.9	
	PIDHS = 1.3			5.6-6.6 Brown to reddish brown gravel and medium to coarse sand.		0.5	
	8-10						
				6.6-10 Olive brown to olive medium to coarse sand and gravel with a trace of ~~mede~~ fine sand and silt. (Sandy till).		0.4	
10'				OC-SB-479-8.0/10-XXX		0.7	
				Bottom of boring = 10' (Refusal).			

Notes
Made 3 initial attempts that met refusal at < 5'.
located near dumpster.

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MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington. Mass.
Client: Olin

Boring: SB-480
File No.:

Contractor: Zebra
Operator: Jason Frederick
Logged By: J. Rawcliffe
Checked By: CTM
Date Start/Finish: 11/16/10
Boring Location:
Ref. Elevation[1]:

Drilling Method: Direct Push
Bore Hole ID/OD: —
~~Auger~~ ID/OD: 1.75" ID
Sampler: MacroCore.
Hammer Wt./ Fall: NA
Water Level[3]:

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	3.4/5.0	1555	0-0.2' Asphalt		PID	
				0.2-0.8 Brown medium sand with a trace sand		0.4	
				0.8-1.1 Dark brown to very sand and organics with some fine sand.		1.3	
				1.1-2.1 Reddish brown medium sand with a little fine sand and traces of coarse sand. Moist. OC-SB-480-0.0/1.0-2XX 1600		11.4	
	PIDHS = 71.6					9.8	
	3-5						
5				2.1-5 Brown to light brown medium sand with a little fine sand.		26.5	
	MC-2 5-8	2.3/3.0	1605	5-6.7 Brown to light brown medium sand with trace coarse sand. OC-SB-		34	
				6.7-8 Olive brown to reddish brown medium to coarse sand and gravel with a trace of fine sand and silt. (Sandy hill).		24	
						9.5	
10						21	
				Bottom of boring = 8' Refusal.			

Notes

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MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington. Mass.
Client: Olin

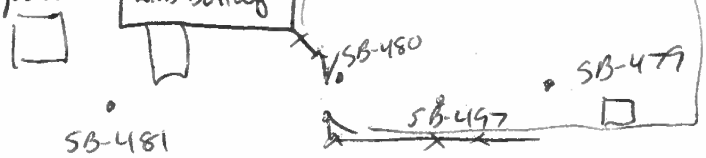
Boring: SB-481
File No.:

Contractor: Zebra	Drilling Method: Direct Push
Operator: Jason Frederick	Bore Hole ID/OD: —
Logged By: J. Rawcliffe	~~Auger~~ ID/OD: 1.75" ID
Checked By: CTM	Sampler: MacroCore.
Date Start/Finish: 11/17/10	Hammer Wt./ Fall: NA
Boring Location:	Water Level[3]:
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	3.9/5.0	1320	0-0.2 Asphalt and cut/ gravel 0.2-1.1 Concrete also veined concrete 1.1-1.4 Dark brown medium coarse sand and gravel. Very moist. OC B 81		PID 0 1.3	
5	PID/FS = 24 4-5			4.4-5.0 Brown to light brown medium with a little coarse sand and traces Sand. Very moist, to wet Red layered appearance.		0.1 7.8 16.9	
	MC-2 5-10	3.7/5.0	1405	5-5.7 Brown to light brown medium sand with a little coarse sand and traces of fine Sand. 5.7-6.6 Brown to olive brown medium to coarse sand and gravel with a little fine sand.		52 66	
10				6.6-7.9 Brown coarse sand and gravel with some medium sand. Wet. OC-SB-481-7.0/9.0 (MS/MSD) XRA (410) 7.9-10 Olive to olive brown medium to coarse sand and gravel with a little fine sand and silt. Massive, very moist to wet. (Till like appearance).		74 18 7.9	
				Refusal at 10' BGS			

Notes Collected "0-1" sample from interval below concrete slab. Made 4 attempts and burnt another core sampler.



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Boring: SB-481

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington
Client: Olin

Boring: SB-482
File No.:

Contractor: Zebra	Drilling Method: Direct Push
Operator: Jason Breedlove	Bore Hole ID/OD: —
Logged By: J. Rawcliffe	Auger ID/OD: —
Checked By: CTM	Sampler: MacroCore 1.75 inches ID
Date Start/Finish: 11/15/10	Hammer Wt./ Fall: NA
Boring Location: —	Water Level[3]:
Ref. Elevation[1]: —	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
weh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	3.2/5.0	1115	0 0.2 Blue asphalt		2.1	
				0 2-1.0 Brown fine to course sand and gravel.		5.0	
	PID HS = 1.7 ppm			1.0 - 2.0 Dark brown to reddish brown medium sand with a little fine sand stratified near top. Moist.		3.2	
				2.0-3.2 Brown to light brown with some reddish stained layers near the bottom. Medium sand with some fine sand and traces of course sand Moist, faint stratified appearance.		3.3	
5						3.0	
	MC-2 5-8	2.9/3.0	1120	5-5.4 Brown to light brown medium sand with a little fine sand and a little to traces of ~0 % gravel.		1.4	
	PID HP = 3.9 ppm			5.4-8.0 Brown to dark brown to olive course sand and gravel with some medium sand and a little to traces of fine sand and silt - bottom (7-8) contains less gravel more silt Moist/Wet		15.7	
						22.0	
						7.1	
						5.0	
				Refusal at 8.0' BGS			
10							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: SB-482

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington
Client: Olin

Boring: SB-483
File No.:

Contractor: Zebra	Drilling Method: Direct Push
Operator: Jason Fredericks	Bore Hole ID/OD:
Logged By: J. Rawcliffe	~~Auger ID/OD~~: Macro core ≈ 1.75 inches ID
Checked By: CTM	Sampler: Macro Core
Date Start/Finish: 11/15/10	Hammer Wt./ Fall: NA
Boring Location:	Water Level[3]: ≈ 8'
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wah = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	PID Analytical Collected (Y/N)	Elevation
0	0-5 MC-1	3.0/5.0	1005	Top 0-0.4 Ground riprap with a little sand.		0.5	
	Bag HS. 0-2=18.1			0.4-0.8 Brown to slight yellow brown fine to coarse sand and gravel. Moist, massive		16.4	
				0.8-1.0 Very dark brown to black sand and gravel		3.1	
				with possible asphalt fragments			
				1.0-2.0 Brown fine to coarse sand with a little gravel. moist. massive			
5	MC-2 5-10	3.8/5.0	1015	5-6.5 Brown to light reddish brown to olive brown medium to coarse sand with some fine sand and a little gravel. Moist to very moist massive			
	Bag HS 5-7 = 2400 ppm						
				6.5-9 Brown to olive brown fine to medium sand with a little silt, coarse sand and gravel.		832	
				Very moist, massive, sweet organic odor		3226	
10	MC-3 10-13'	2.8/3.0	1030	10-11.3 Brown to dark brown fine to coarse sand and gravel with a little silt. Moist, massive		38	
	Bag HS 10-12 = 801 ppm					420	
				11.3-13' Olive to olive brown to reddish brown fine to coarse sand and gravel with some silt Wet, massive		2050	
						190	
15				Refusal at 13' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington
Client: Olin

Boring: SB-484
File No.:

Contractor: Zebra	Drilling Method: Direct Push
Operator: Jason Fredericks	Bore Hole ID/OD: —
Logged By: J. Ratcliffe	Auger ID/OD: 1.75" ID
Checked By: CTM	Sampler: Macro
Date Start/Finish: 11/15/10	Hammer Wt./ Fall: —
Boring Location: —	Water Level[3]:
Ref. Elevation[1]: —	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
wsh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	3.6/5.0	1047	0-0.2 Black asphalt fragments.		N	
	PID HS = 0.1			0.2-1.2 Brown to dark brown fine to medium sand with a little course sand and gravel. Moist Stratified.		0	
						0.2	
				1.2-3.6 Brown to light brown to slightly reddish brown medium sand with a little fine sand and a little course sand and trace of gravel. Moist, some course stratification			
5	MC-2 5-7'	1.9/2.0	1100	5-5.7' light brown to brown medium sand with some fine sand and a little course sand.		3.2	
	PID HS = 10.1			5.7-7.0 Brown to olive brown to gray fine to course sand and gravel with rock fragments - Moist, massive		55	
				Bottom of Boring = 7.0' BGS Refusal			
10							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: SB-484

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington
Client: Olin

Boring: SB-485
File No.:

Contractor: Zebron
Operator: Jesman Frederick
Logged By: J. Rawcliffe
Checked By: CTM
Date Start/Finish: 1/15/10
Boring Location: —
Ref. Elevation[1]:

Drilling Method: Direct Push
Bore Hole ID/OD: —
~~Auger ID/OD~~: — 1.75 in ID
Sampler: MacroCore
Hammer Wt./ Fall:
Water Level[3]:

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
wsh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	3.9/5.0	1145	0 0.2 Black asphalt 0.2 - 0.6 Brown medium to coarse sand with a little fine sand and gravel. 0.6 - 0.7 Dark brown to black fine to medium sand OC-SB 485-0/1-XXX 0.7 - 1.8 Reddish brown fine to medium sand with a trace of coarse sand. and a couple roots or twigs. 1.8 - 3.4 Light brown medium sand with a little fine sand and traces of coarse sand. Moist some faint stratification with occational thin layers		0 Yes 0	
	Sample time 1200 PID HS 0.7ppm						
5	MC-2 5-10	3.6/5.0	1152	5 - 6.1 Light brown medium sand with little fine sand and traces of coarse sand. 6.1 - 7.5 Brown coarse sand and gravel with a little medium sand and traces of fine sand. OC-SB-485-6.0/8.0-XXX		0 YES 0.3	
	Sample time 1205 PID HS 4.0ppm						
				7.5 - 8.6 Olive medium to coarse sand and gravel. Moist, massive dense, tillite like appearance. with a little fine sand and silt.		0.5 13.9	
10	MC-3 10-13	2.6/3.0	1201	10 - 13' Brown to olive brown medium to coarse sand and gravel with a little fine sand and silt. Moist to wet, massive. OC-SB-485-11/13-XXX		0.8 2.5 4.8 8.4 YES	
	Sample time 1210 PID HS = 18.1ppm						
						6.3	

Notes

VOC, SVOC, VPH, EPH

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: SB-485

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington
Client: Olin

Boring: SB-486
File No.:

Contractor: Zebra
Operator: Jason Frederick
Logged By: J. Rawcliffe
Checked By: CTM
Date Start/Finish: 11/15/10
Boring Location: —
Ref. Elevation[1]:

Drilling Method: Direct Push
Bore Hole ID/OD: —
Auger ID/OD: — 1.75" ID
Sampler: MacroCore
Hammer Wt./ Fall: NA
Water Level[3]:

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined CompressiveStrength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	3.7/5.0	1350	0 0.3 Dark brown to black asphalt and medium to coarse sand and gravel.		PID 0	
	0-5' PID HS = 0.2			0.3-1.2 Brown to light brown medium to coarse sand with some fine sand		0	
				1.2-1.4 Dark brown fine to medium sand and organic material			
				1.4-2.4 Reddish brown to brown medium sand with a little fine sand and trace of coarse sand. Moist		0	
				2.4-3.8 Brown to light brown medium sand with a little fine sand and a little coarse sand. Moist		0.3	
5	MC-2 5-10	3.8/5.0	1400	5-5.7 Brown to light brown medium sand with a little fine		0.1	
				5.7-9' Brown to olive brown medium to coarse sand and gravel with a little fine sand and a trace of silt. Moist to very moist, massive,		0.4	
				till like appearance. Sweet organic odor.		0.5	
	7-9' PID HS = 1493					1.3	
						2	
10	MC-3 10-12.7	2.7/2.7	1405	10-12.7 Brown to reddish brown to olive brown medium to coarse sand and gravel with a little fine sand and a trace of silt. Moist, massive, till like appearance. Sweet organic odor			
	10-12' PID BHE HS = 2614						
						190	

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington
Client: Olin

Boring: SB-487
File No.:

Contractor: Zebra	Drilling Method: Direct Push
Operator: Jason Fredgeth	Bore Hole ID/OD: —
Logged By: J. Rawcliffe	Auger ID/OD: — 1.75" ID
Checked By: CTM	Sampler: MacroCore
Date Start/Finish: 11/15/10	Hammer Wt./ Fall: NA
Boring Location: —	Water Level[3]:
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	4.0/5.0	1425	0-0.2 Black asphalt 0.2-0.8 Brown medium to coarse sand and gravel. 0.8-1.0 Dark brown medium sand with some organic material and a trace of fine to coarse sand. 1.0-3.0 Reddish brown medium sand with a little fine sand and a little to trace of coarse sand. Moist, massive some root fibers 3-5 Brown medium sand with a little coarse sand and a trace of fine sand. Moist, some crude stratification.		PID 9.9 14.9 38.5 24.5 16.3 32.6 35.0	
	PIDHS=5.7 0-5						
5	MC-2 5-9.2	3.8/4.2		Brown to olive brown medium to coarse sand and gravel with a little fine sand and a trace of silt. Very moist to wet, massive, till-like appearance.		27.7 44.6	
	PIDHS=2.1 6-8						
						24.1 16.2	
10							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington
Client: Olin

Boring: SB-488
File No.:

Contractor: Zebra	Drilling Method: Direct Push
Operator: Jason Fredeagle	Bore Hole ID/OD: —
Logged By: J. Rawcliffe	~~Auger~~ ID/OD: 1.75" ID
Checked By: CSM	Sampler: MacroCore
Date Start/Finish: 11/15/10	Hammer Wt./ Fall: NA
Boring Location: —	Water Level[3]:
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	3.6/5.0	1505	0-0.2 Black asphalt.	(PID)		
				0.2-1.2 Brown medium to coarse sand and gravel with a little fine sand.	3.7		
	PID HS = 0.5			1.2-1.5 Very dark brown medium sand with some organics and a little fine sand.	6.3		
	3-5						
				1.5-2.1 Reddish brown medium sand with a little fine sand and occasional organics roots	6.6		
				2.1-5 light brown to brown medium sand with a little fine sand and pieces of coarse sand and	3.3		
5				silt. Very moist, faint strata location.	1.4		
	MC-2 5-6.1	0.7/1.1	1510	5-6.1 Brown to light brown medium sand with a little fine sand and a little to trace of coarse sand and gravel.	0.5		
	PID HS = 9.4				0.4		
	5-6						
10							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project:	Olin Chemical Superfund Site
Location:	Wilmington
Client:	Olin

Boring: SB-489
File No.:

Contractor: Zebra
Operator: Jason Fredemich
Logged By: J. Rawcliffe
Checked By: CTM
Date Start/Finish: 11/15/10
Boring Location: —
Ref. Elevation[1]:

Drilling Method: Direct Push
Bore Hole ID/OD: —
~~Auger~~ ID/OD: 1.75" ID
Sampler: Macrocore
Hammer Wt./ Fall: NA
Water Level[3]: —

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined CompressiveStrength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	3.6/5.0	1530	0-0.2 Black asphalt		PID	
				0.2-1.2 Brown medium to coarse sand		0.6	
	See SB-488 for Heatcore Description			1.2-1.4 Dark brown to reddish brown medium with some organics		0.2	
				1.4-2.1 Reddish brown medium sand with some organics and a little fine sand	89-5	YES xxx	
				2.1-5 Brown to light brown medium sand with a little fine sand and a little to traces coarse sand and silt (0-5 Similar to SB-488)			
5	MC-2 5-9.0	3.1/4.0	1540	5-9' Brown to olive brown medium sand and gravel with traces of coarse sand and silt. Very moist, water appears at bottom of recovery		0.1	
						YES	
						0.2	
	7-9' PID HS = 14.0 ppm 11/16/10				xxx	1.1	
				Bottom of boring - 9.0 BGS		50.4	
10	11/16/10 MC-3 10-12.5	2.1/2.5	0825	Olive to olive brown medium to coarse sand and gravel with a little fine sand and traces of silt. Wet, massive, (Till).		12.1	
						33.1	
	PID=HS = 28.2 ppm 10-12.5					27.2	
				Refusal at 12.5' BGS			

Notes Accidentally redrilled at SB-489 to collect analytes as I mixed up SB-490 and SB-489 locations. Geoprobe showing elevated PID readings at 9-12.5'. Stepped out to See

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Page 1 of 1

Boring: SB-489

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington. Mass.
Client: Olin

Boring: SB-490
File No.:

Contractor: Zebra	Drilling Method: Direct Push
Operator: Jason Frederick	Bore Hole ID/OD: —
Logged By: J. Rawcliffe	~~Auger~~ ID/OD: 1.75" ID
Checked By: CTM	Sampler: MacroCore.
Date Start/Finish: 11/15/10	Hammer Wt./ Fall: N/A
Boring Location: —	Water Level[3]: est 8-9-
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	3.7/5.0	1600	0-0.2 Asphalt OC-SB-490-0.0/10-XXX 1115		PID	
				0.2-1.1 Brown medium to coarse sand and gravel with a little fine sand. Massive (Fill)		0.1	
	PID HS = 8.8 ppm			1.1-2.3 Dark reddish brown to reddish brown medium sand with a little fine sand and a trace of coarse sand.		0	
	0-5						
	PID HS = 9.6 ppm			2.3-5 Light brown to brown medium sand with a little to traces of fine sand and tones of coarse sand Moist, some faint stratification		0.2	
	3-5					0.4	
5						0.2	
	MC-2 5-90	4.1/5.0	1605	5-6.5 light brown to brown medium sand with little to traces of fine sand and tones of coarse sand Moist, some faint stratification.		0.2	
	PID HS = 15.4 ppm			6.5-10 Brown to olive brown medium to coarse sand and gravel with traces of fine sand and silt. Very moist to wet, Massive till-like appearance.		0.3	
	7-9						
10				Refusal at 10' BGS OC-SB-490-7.0/9.0-XXX (2nd) 1115			

Notes

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Boring: SB-490

MACTEC	Project: Olin Chemical Superfund Site Location: Wilmington. Mass. Client: Olin	Boring: SB-491 File No.:

Contractor: Zebra	Drilling Method: Direct Push	**Definitions:** S = Split Spoon Sample U = Thin Wall Tube Sample R = Rock Core Sample V = Insitu Vane Shear Test q_u = Unconfined Compressive Strength (psf) woh = weight of 140 lb. hammer wor = weight of rods wc = Water Content, percent oc = Organic Content, percent
Operator: Jason Frederick	Bore Hole ID/OD: —	
Logged By: J. Rawcliffe	~~Auger~~ ID/OD: 1.75" ID	
Checked By: CJM	Sampler: MacroCore.	
Date Start/Finish: 11/16/10	Hammer Wt./ Fall: NA	
Boring Location:	Water Level[3]:	
Ref. Elevation[1]:		

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5 PID H.S. = 0.4 ppm 0-5	3.6/5.0	0905	0-0.2 Asphalt 0.2-1.1 Brown medium ~~sand~~ to coarse sand and gravel with a little fine sand. 1.1-1.3 Dark brown medium sand with a little fine sand and traces of organics.		PID 0 0	
				1.3-2.2 Reddish brown medium [illegible] fine sand. 2.2-5 Brown to light brown medium [illegible] coarse sand a little fine sand and [illegible] some faint stratification			
5	MC-2 5-10 PID HS = 9.1 ppm 7-9	4.0/5.0	0910	5-6.1 light brown medium sand with a little fine sand and traces of coarse sand. Moist, faintly stratified. 6.1-7.5 Gravel with some olive to brown medium to coarse sand.			
				7.5-10 Olive brown to dark [illegible] gray medium coarse sand and gravel [illegible] and traces of silt. Very m[illegible] Very [illegible] sweet organic od[illegible]		15.2 25.9 ~~2500~~	
10				Refusal at ≈10' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington. Mass.
Client: Olin

Boring: SB-492
File No.:

Contractor: Zebra	Drilling Method: Direct Push
Operator: Jason Frederick	Bore Hole ID/OD: —
Logged By: J. Rawcliffe	Auger ID/OD: 1.75" ID
Checked By: CTM	Sampler: MacroCore.
Date Start/Finish: 11/10/10	Hammer Wt./ Fall: N/A
Boring Location: —	Water Level[3]: —
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	3.5/5	1005	0-0.2' plant		PID	
	PID HS = 7.1 ppm 0-5			0.2-0 Reddish brown to medium sand and gravel.		65	
				0.8-1.2 Very dark brown and charcoal debris and a little silt. Moist		20.1	
				1.2-2.0 Reddish brown fine sand and traces of silt		25.8	
				2.0-5.0 Brown to light brown medium sand a little fine sand and traces silt some faint stratification		1.1	
5	MC-2 5-7	2.0/2.0	1010	5-6 light brown to brown medium sand with a little fine sand.		7.4	
	PID HS = 0.7 ppm 5-7'			6-7 Reddish brown to brown medium to coarse sand and gravel with a little fine sand.		3.1	
				Tip of sample becomes olive dense silt-like material.		5.8	
				Bottom of boring = 7' Refusal.			
10							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington. Mass.
Client: Olin

Boring: SB-493
File No.:

Contractor: Zebra	Drilling Method: Direct Push
Operator: Jason Frederick	Bore Hole ID/OD: —
Logged By: J. Rawcliffe	Auger ID/OD: 1.75" ID
Checked By: CTM	Sampler: MacroCore.
Date Start/Finish: 11/16/10	Hammer Wt./ Fall: NA
Boring Location: —	Water Level[3]: —
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	2.1/5.0	1025	0-0.2 Asphalt	PID		
				0.2-0.8 Dark brown to brown medium to coarse sand w/gravel. Moist, massive	0.1		
	PID HS = 0.5						
	0-5			0.8-1.3 Reddish brown medium sand with a trace of fine sand	0.6		
				1.3-5 Brown to light brown to reddish brown medium sand with a little fine sand. Moist, slightly stratified.	0.2		
					0.3		
5	MC-2 5-6.5	1.4/1.5	1030	5-6.5 light brown medium sand with little fine sand. Moist, stratified.	0		
	PID HS = 0.5				0		
	4-6			Refusal at 6.5' BGS			
10							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: SB-493

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington. Mass.
Client: Olin

Boring: SB-494
File No.:

Contractor: Zebra	Drilling Method: Direct Push
Operator: Jason Frederick	Bore Hole ID/OD: —
Logged By: J. Rawcliffe	~~Auger~~ ID/OD: 1.75" ID
Checked By: CTM	Sampler: MacroCore.
Date Start/Finish: 11/16/10	Hammer Wt./ Fall: NA
Boring Location:	Water Level[3]: ≈ 7-8'
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	3.2/5.0	1145	0-0.2 Asphalt 0.2-1.1 Reddish brown medium to sand and gravel. OC-SB-494-0/1.0- 1200 1.1-1.6 Brown to very dark brown silt and medium to		PID 0 Yes 0	
	PID HS = 0.9 0-5			fine sand and organic material. 1.6-5 light brown to brown medium sand a little fine sand and a trace of coarse sand with some reddish brown stained layers. Wood			
5	MC-2 5-10	3.0/5.0	1155	5-7.1 light brown to brown medium sand with a little fine sand and a trace of coarse sand, damp moist to wet, stratified with some coarse layers and some reddish stained layers. 1205 OC-SB-494-6.0/8.0-XXX		0	
	PID HS = 1.5 6-8			7.1-10 Brown to olive brown medium to coarse sand with some gravel and a little fine sand. Very moist to wet, massive grades to till-like material at bottom of recovery.		0 Yes 0	
10	MC-3 10-14	2.0/4.0	1205	10-14 Brown medium to coarse sand and gravel with a little fine sand. Wet, dense, massive. 1210 OC-SB-494-12/14-XXX		0 0 Yes	
	PID HS = 2.4 12-14						

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington. Mass.
Client: Olin

Boring: SB-495
File No.:

Contractor: Zebra	Drilling Method: Direct Push
Operator: Jason Frederick	Bore Hole ID/OD: —
Logged By: J. Rawcliffe	~~Auger~~ ID/OD: 1.75" ID
Checked By: CTM	Sampler: MacroCore.
Date Start/Finish: 11/16/10	Hammer Wt./ Fall: NA
Boring Location: —	Water Level[3]: —
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	4.0/5.0	1315	0-0.9 Very dark brown to black medium fine sand and organics		PID 0.1	
				0.9-2 Reddish brown medium sand w/ fine sand trace silt some root fibers.		0.1	
	PID #5 = 1.7			2-5 Brown to light brown medium sand w/ a trace of fine and coarse sand. No stratification.		1.3	
	3-5					0.6	
5						0.3	
	MC-2 5-6.5	1.5/1.5	1320	5-5.3 Brown to light brown medium sand with a trace of fine sand and coarse sand.			
				5.3-6.5 Brown to olive brown medium to coarse sand and gravel with a trace of fine sand and silt. Moist, massive (fill).			
				Bottom of boring = 6.5' Refusal (3rd attempt).			
10							

Notes Made 2 attempts that met with refusal less than 5' BGS

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington. Mass.
Client: Olin

Boring: SB-496
File No.:

Contractor: Zebra
Operator: Jason Frederick
Logged By: J. Rawcliffe
Checked By: CTM
Date Start/Finish: 11/16/10
Boring Location:
Ref. Elevation[1]:

Drilling Method: Direct Push
Bore Hole ID/OD: —
~~Auger~~ ID/OD: 1.75" ID
Sampler: MacroCore.
Hammer Wt./ Fall: N/A
Water Level[3]: —

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	3.0/5.0	1350	0-1.0 Dark brown to very dk brown medium sand with a little fine sand organics.		PID	
				1405 -SB-496-0.0/1.0-xx		0	
	PID HS = 1.0			1-5 Reddish brown to brown medium sand with a little coarse sand and		Yes	
	0-5					0	
				lenses of fine sand. Moist, some crude			
				stratification, root fibers.			
	PID HS = 1.0					0.1	
	3-5						
5				5-6.5		0.1	
	MC-2 5-6.5	1.4/1.5	1400	Brown to olive brown to lt medium to coarse sand and gravel with of fine		0	
	PID HS = 0.9			sand and silt. Moist,			
	5-6			1405 DC-SB-496-5.0/ xx		0.1	
				Bottom wg = 6			
10				(Made 2 attempts got refusal @ both times)			

Notes Boring located next to pile of large boulders or rock outcrop

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington. Mass.
Client: Olin

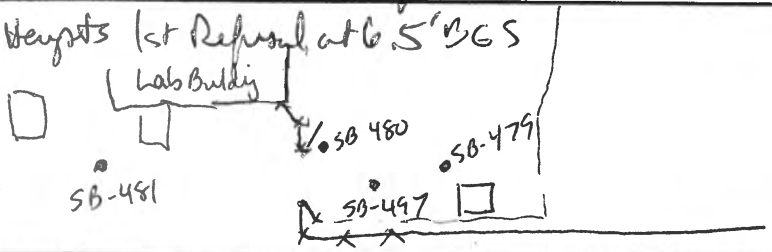
Boring: SB-497
File No.:

Contractor: Zebra	Drilling Method: Direct Push
Operator: Jason Frederick	Bore Hole ID/OD: —
Logged By: J. Rawcliffe	~~Auger~~ ID/OD: 1.75" ID
Checked By: CJM	Sampler: MacroCore.
Date Start/Finish: 11/17/10	Hammer Wt./ Fall: NA
Boring Location:	Water Level[3]: ±6-7' BGS
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percen

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-5	3.2/5.0	1445	0-0.2' Asphalt OC-SB 497-0.0/1.0-XXX (1450) 0.2-0.8 Brown medium to coarse sand with some gravel. 0.8-1.0 Dark brown medium sand with a trace of fine sand and coarse sand organics		PID 3.5 7.9	
				1.0-5.0 Brown to slightly reddish brown to light brown medium sand with a little fine sand and traces of coarse sand. Moist, some stratification.		21.7 34	
5	MC-2 5-10	3.5/5.0	1505	5-6.5 Brown to light brown medium sand with a little fine sand and traces of coarse sand. Very moist to wet, slight stratification. OC-SB-497-6.0/8.0-XXX (1510)		18 24	
	PIDITS = 35 6-8			6.5-10 Brown to olive brown medium to coarse sand and gravel, with traces of fine sand and silt, wet, massive.		25 18 16	
10	MC-3 10-13	2.0/3.0	1520	10-13 Olive brown to light olive brown. medium to coarse sand and gravel with a little fine sand and silt. Wet, massive		5.8 4.1	
				OC-SB-497-11/13-XXX (1525) Refusal at 13' BGS			

Notes 2 attempts 1st Refusal at 6.5' BGS



Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: SB-497

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington, Mass.
Client: Olin

Boring: SB-500
File No.:

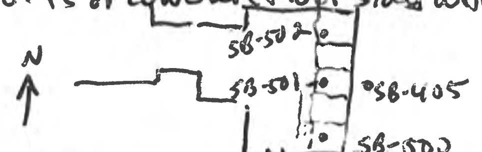
Contractor: Zebra	**Drilling Method:** Direct Push
Operator: Jason Frederick	**Bore Hole ID/OD:** —
Logged By: J. Rawcliffe	**~~Auger~~ ID/OD:** 1.75" ID
Checked By: CJM	**Sampler:** MacroCore.
Date Start/Finish: 11/17/10	**Hammer Wt./ Fall:** NA
Boring Location:	**Water Level[3]:** —
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-3	1.2/3.0	1020	0-0.45' Concrete slab reinforced with wire mesh		PID 0.3	
1				0.45-1.1 Brown medium to coarse sand and gravel with a little fine sand and a trace of silt. (Subgrade fill)			
	PID FS = 0.9 0.5-3			1025 OC-SB-500-0.5/3.0-xxx			
2	~~MC-2~~			1.1-3.0 Olive to olive gray medium to coarse sand and gravel w l trace sand and silt (Till)			
3	MC-2			Encountered refusal at Below			
4				Refusal at 3 below slab			
5							
6							

Notes

Boring is located in basement of lab building in SE corner room of building. cored thru 0.45' of concrete floor slab with 3" OD coring drill. Floor slab is approximately 6.5' below ground surface.



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Boring: SB-500

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington. Mass.
Client: Olin

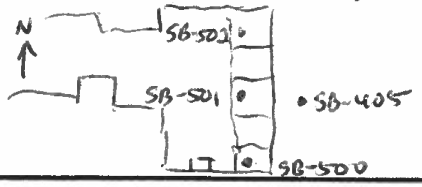
Boring: SB-501
File No.:

Contractor: Zebra	Drilling Method: Direct Push
Operator: Jason Frederick	Bore Hole ID/OD: —
Logged By: J. Rawcliffe	~~Augers~~ ID/OD: 1.75" ID
Checked By: CTM	Sampler: MacroCore.
Date Start/Finish: 11/17/10	Hammer Wt./ Fall: NA
Boring Location:	Water Level[3]:
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-3	1.9/2.5	1055	0-0.4 Concrete floor slab		PID	
				0.4-1.1 Brown to dark brown medium to coarse sand and gravel with a trace of fine sand and silt. Wet, unconsolidated (Subgrade fill).		0	
1						0	
				OC-SB-501-0.5/3.0-xxx (1100)			
	PID/FS = 0.4ppm			1.1-1.5 Brown medium to coarse sand with a trace of fine sand. Wet.			
2	1-3 ~~MC-2~~						
				0 to ~ medium to sand and gravel w sand		0	
3						0	
				Refusal at 3' BGS			
4							
5							

Notes Boring is in basement of lab building closest to SB-405 approx. 11' west of wall. Concrete floor slab ≈ 0.4-0.45' thick floor slabs ≈ 6.5' below grade



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Boring: ~~SB-501~~

SB-501

MACTEC

Project: Olin Chemical Superfund Site
Location: Wilmington. Mass.
Client: Olin

Boring: SB-502
File No.:

Contractor: Zebra	Drilling Method: Direct Push
Operator: Jason Frederick	Bore Hole ID/OD: —
Logged By: J. Rawcliffe	Auges ID/OD: 1.75" ID
Checked By: CTM	Sampler: MacroCore.
Date Start/Finish: 11/17/10	Hammer Wt./ Fall: NA
Boring Location:	Water Level[3]: —
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	MC-1 0-3	1.5/2.5	1120	0-0.4 Concrete slab 0.4-1.0 Brown gravel with some to silt, medium to coarse sand. Subgrade fill, wet.		P/N O	
	PID HS = 0.4 ppm 0.5-3			1.0-3.0 Brown medium to coarse sand and gravel with a trace of fine sand. Wet, massive.		O	
2	~~MC-2~~					O	
3	MC-2 3-5	1.0/2.0	1130	3.0-5.0 Brown to light brown medium to coarse sand and gravel with a little to a trace of fine sand and silt. Massive, wet. OC-SB-502-3.0/5.0-XXX (1135)		O	
4	PID HS = 0.1 ppm 4-5					O	
5							

Notes Boring is in basement of lab building bathroom in NE corner with sump. Concrete slab is ≈0.4' thick. Floor slab is ≈6.5' below grade.

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Boring: SB-502

amec

Project: olin, wilmington
Location: ~~wilmington, nc~~
Client: SB-480 olin

Boring: SB-480
File No.:

Contractor: TDS	Drilling Method: direct push		
Operator: [illegible]	Bore Hole ID/OD: ~~3.0~~ 2.25"		
Logged By: DLE	Auger ID/OD: 2.0" x 2.25"		
Checked By: MAM 1/2/13	Sampler: NJD		
Date Start/Finish: 12-11-12 / 00:00:00	Hammer Wt./ Fall: /		
Boring Location: SB-480	Water Level[3]: ≈ 9' BGS		
Ref. Elevation[1]: /			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140lb hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID (ppm) / Elevation
0				0 - 0.2: Asphalt			
1	/	5.0/	/	0.2 - 1.2: Mostly brown-red brown med SAND, poorly graded	SP	N	30.2
5		2.8		1.2 - 2.8: Same as above but brown. tan			
5				0 - 1.3: Same as 1.2 - 2.8 above			
1	OC-SB-480- 6.0/	6.0/		1.3 - 2.2: Mostly brown - gray Sand and gravel, some cobbles	SM	Y	24.2
9.8	6.0/8.0 -xxx	3.3	10:10	~~2.2-3~~ 2.2-3.3: Mostly brown,			
				poorly graded coarse SAND, some gravel, wet			
				Refusal @ 9.8'			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec

Project: ~~SB-484~~ Olin, Wilmington
Location: SB-484
Client: Olin

Boring: SB-484
File No.:

Contractor: TDS	Drilling Method: direct push		
Operator: James	Bore Hole ID/OD: 2.25"		
Logged By: DLL	Auger ID/OD: 2.0" x 2.25"		
Checked By: MAM 1/2/13	Sampler: NSD		
Date Start/Finish: 12-11-12 / "	Hammer Wt./ Fall: /		
Boring Location: SB-484	Water Level[3]: /		
Ref. Elevation[1]: /			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Elevation (ft)
0				0 - 0.2: Asphalt			
1		5.0'		0.2 - 1.2: Mostly brown poorly graded med SAND, uniform, loose, dry	SP	N	2.2
5		2.9		1.2 - 2.9: Same as above, but tan			
5				0 - 1.4: Same as 0.2 - 1.2 above			
1	oc-SB-484-5.0'	5.0'	10:40	1.4 - 2.1: Mostly brown, gray poorly graded SAND and SILT, wet, loose, damp	SP	Y	29.6
7.5	5.5/7.5-xx	2.1					
				Refusal @ 7.5' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec

Project:	Olin, Wilmington	Boring: SB-486
Location:	SB-486	File No.:
Client:	Olin	

Contractor: TDS	Drilling Method: Direct push	**Definitions:**
Operator: James	Bore Hole ID/OD: 2.25"	S = Split Spoon Sample
Logged By: DLC	Auger ID/OD: 2.0" / 2.25"	U = Thin Wall Tube Sample
Checked By: MAM 1/2/13	Sampler: DLC	R = Rock Core Sample
Date Start/Finish: 12-11-12/	Hammer Wt./ Fall: /	V = Insitu Vane Shear Test
Boring Location: SB-486	Water Level[3]: /	q_p = Unconfined Compressive Strength (psf)
Ref. Elevation[1]: /		woh = weight of 140 lb hammer
		wor = weight of rods
		wc = Water Content, percent
		oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Elevation
0				0.0-0.2: Asphalt			
1	/	5.0/	5-ref	0.2-1.0: Mostly brown-tan moist poorly graded med SAND, some cobbles gravel	SP	N	3.9
5	/	3.1	3-1@	1.0-3.1: Mostly brown-tan			
				poorly graded med SAND uniform, loose, dry			
5	DC-SB-486-5.0/				SP	Y	122
1	8.0/10-xxf	2.4	12:15	0-2.4: Mostly brown-dark brown poorly graded med SAND, some cobbles			
10				some GRAVEL			
				Refusal @ 10.2' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec

Project:	olin, Wilmington	Boring: SB-491	
Location:	SB-491	File No.:	
Client:	olin		

Contractor:	TDS	Drilling Method:	Direct Push
Operator:	James	Bore Hole ID/OD:	2.25"
Logged By:	DLC	Auger ID/OD:	2.0" x 2.25"
Checked By:	MAM 1/2/13	Sampler:	MSD
Date Start/Finish:	12-11-12	Hammer Wt./Fall:	/
Boring Location:	SB-491	Water Level[3]:	/
Ref. Elevation[1]:	/		

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID ~~Elevation~~
0-5	~~OC~~	5.0/3.6		0-0.2: Asphalt 0.2-0.5: Mostly brown poorly graded med SAND, some gravel, loose dry 0.5-1.6: Mostly dark brown-dark brown med poorly graded SAND	SP	N	1.7
5-8	OC-SB-491-6.0/8.0-XX	5.0/3.6	13:00	1.6-3.6: Same as above, but brown-gray	SP	Y	1.3
				Refusal @ 8' BGS			

Notes

XMS/MSD and DUP-3 collected

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec

Project:	Olin, Wilmington
Location:	~~Wilm~~ SB-503
Client:	Olin

Boring: SB-503
File No.:

Contractor:	TDS	Drilling Method:	Direct push
Operator:	James	Bore Hole ID/OD:	2.25"
Logged By:	DLC	Auger ID/OD:	2.0"/2.25"
Checked By:	MAM 1/2/13	Sampler:	NP
Date Start/Finish:	12-10-12 / "	Hammer Wt./ Fall:	/
Boring Location:	SB-503	Water Level[3]:	≈ 14' BGS
Ref. Elevation[1]:	/		

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	~~Elevation~~ PID
0-5	OC-SB-503-0.0/1.0-XXX	5.0/1.8	9:00	0-0.2: Mostly dk - dark brown organics + SILT, some gravel 0.2-0.3: Brown SAND, uniform, loose, dry 0.3-1.8: Mostly brown med-fine SAND, poorly graded, moist, some gravel/cobbles	SP	Y	0.1
5-10	OC-SB-503-6.0/8.0-XXX	5.0/4.1	9:15	0-1.1: Mostly red brown med, poorly graded SAND, wet, loose 1.1-4.1: Mostly brown - tan med.-coarse SAND, layer of gravel @ 2.3-2.4, poorly graded, wet.	SP	Y	0.0
10-15	OC-SB-503-13/15-XXX	5.0/4.8	9:30	0.0-2.0: Same as above, but some gravel 2.0-4.8: Mostly gray GRAVEL and SAND, dense, wet	SM	Y	2.2
				Refusal @ 15' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: 503

amec	Project: aim, Wilmington Location: SB-504 Client: aim	Boring: SB-504 File No.:

Contractor: TDS	Drilling Method: Direct Push	Definitions: S = Split Spoon Sample U = Thin Wall Tube Sample R = Rock Core Sample V = Insitu Vane Shear Test q_p = Unconfined Compressive Strength (psf) woh = weight of 140lb hammer wor = weight of rods wc = Water Content, percent oc = Organic Content, percent
Operator: JCMAS	Bore Hole ID/OD: 2.25"	
Logged By: DLC	Auger ID/OD: 2.0" x 2.25"	
Checked By: MAM 11/2/13	Sampler: DLC / NJD	
Date Start/Finish: 12-11-12 / 11	Hammer Wt./ Fall: /	
Boring Location: SB-504	Water Level[3]: /	
Ref. Elevation[1]: /		

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Elevation (BGS)
0				0-0.2: Asphalt			
1	OC-SB-504-0.0/1.0-X+4	5.0/2.7	8:05	0.2-2.7: Mostly brown-light brown med poorly graded med SAND, uniform, loose, dry	SP	Y	38.0
5							
5				0-1.3: Mostly same as 0.2-2.7' above			
1	OC-SB-504-7.5/9.5-X+4	5.0/3.4	8:30	1.3-3.4: Brown-tan: poorly graded med SAND, uniform, wet, dry	SP	Y	102
10							
				Refusal @ 9.8' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: 504

amec

Project: Clin. Wilmington
Location: SB-505
Client: Clin

Boring: SB-505
File No.:

Contractor: TDS	Drilling Method: Direct Push		
Operator: James	Bore Hole ID/OD: 2.25"		
Logged By: DLC	Auger ID/OD: 2.0" & 2.25"		
Checked By: MAM 1/2/13	Sampler: DLC / MTD		
Date Start/Finish: 12-11-12/11	Hammer Wt./ Fall: /		
Boring Location: SB-505	Water Level[3]: /		
Ref. Elevation[1]: /			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
wob = weight of 140 lb hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Elevation
0-5	OC-SB-505-	5.0/	9:25	0.0-0.2: concrete frags 0.2-2.0: Mostly brown poorly graded med SAND, loose, dry 2.0-2.7: same as above, but coarser/med-coarse,	SP	Y	30.2
	0.0/1.0-Rx1	2.7					
5-7	OC-SB-505	5.0/		0.0-1.2: Mostly brown tan poorly graded med SAND, loose, dry Refusal @ 7.0' BGS	SP	Y	62.0
	*5.0/7.0	1.2	9:45				

(DV)

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: 505

amec

Project: olin: wilmington
Location: SB-506
Client: olin

Boring: SB-506
File No.:

Contractor: TDS	Drilling Method: direct push
Operator: James	Bore Hole ID/OD: 2.25"
Logged By: DLC	Auger ID/OD: 2.0" 12.25"
Checked By: 1/2013	Sampler: ND
Date Start/Finish: 12-10-12 / "	Hammer Wt./ Fall: /
Boring Location: SB-506	Water Level[3]: ≥ 14' BGS
Ref. Elevation[1]: /	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
wob = weight of 140lb hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Elevation (ft)
0 - 5	oc-SB-506-0.0|1.0-x+1	5.0|4.0	10:00	0.0-0.5: Mostly brown - dark brown topsoil; some grass, some organics, silt 0.5-2.8: Mostly brown - red brown SAND and silt; uniform; damp 2.8-4.0: Brown - red brown SAND and silt, damp, uniform	SM	Y	1.3
5 - 10	oc-SB-506-6.0|8.0-x+1	5.0|2.8	10:20	0-0.9: Mostly brown - red poorly graded med SAND; some silt, moist 0.9-2.8: Same as above, but brown (lighter w/ brown) some odor	SP	Y	6.2
10 - 16	oc-SB-506-10|12-x+4	5.0|1.4	10:45	0-1.4 Mostly brown - grey SAND + GRAVEL, loose, wet	GM	Y	10.5
				Refusal @ 14' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: 506

amec

Project: Olin; Wilmington
Location: SB-507
Client: Olin

Boring: SB-507
File No.:

Contractor: TDS	Drilling Method: D
Operator: James	Bore Hole ID/OD: 2" / 2.25" 2.25"
Logged By: DLL	Auger ID/OD: 4" / 4" 2.0" / 2.25"
Checked By: MAM 1/2/13	Sampler: NJD
Date Start/Finish: 12-10-12 / 14	Hammer Wt./ Fall: /
Boring Location: SB-507	Water Level[3]: 2 15' BGS
Ref. Elevation[1]: /	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
wob = weight of 140 lb hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Elevation (D)
0 / 5	oc-SB-507-0.0/1.0-xxx	5.0/ 1.7 (D) 2.5	13:20	0.0-0.2: Layer of asphalt 0.2-2.7: Mostly brown-light brown med SAND, some fine sand, loose, poorly graded	SP	Y	<0.1
5 / 10	oc-SB-507-6.0/8.0-xxx	5.0/ 2.9	13:30	0.0-2.0: Mostly brown-gray-tan med. poorly graded med SAND, (D) loose, damp 2.0-2.4: Mostly brown-grey SAND and GRAVEL, damp	SM	Y	<0.1
10 / 15	oc-SB-507-13/15-xxx	5.0/ 1.8	13:50	0.0-1.8: Mostly brown-grey med-coarse SAND and GRAVEL, wet, loose	SW	Y	<0.1
15 / 17	/	2.0/ 1.3		0.0-1.3: Same as above, but more gravel, some rock frags/cobbles	GM	N	<0.1
				Refusal @ 17' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec

Project:	Olin Wilmington
Location:	SB-508
Client:	Olin
Boring:	SB-508
File No.:	

Contractor:	TDS	Drilling Method:	direct push
Operator:	James	Bore Hole ID/OD:	2.25"
Logged By:	DLC	Auger ID/OD:	2.0 x 2.25"
Checked By:	MAM 1/2/13	Sampler:	NJD
Date Start/Finish:	12-11-'12 / ''	Hammer Wt./ Fall:	/
Boring Location:	SB-508	Water Level[3]:	≈ 11' BGS
Ref. Elevation[1]:	/		

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No. (Sample Information)	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID (~~Elevation~~)
0-5	OC-SB-508-0.0/1.0-XX	5.0/4.3	13:25	0-0.9: Mostly brown poorly graded med SAND, some gravel, loose, dry 0.9-2.0: Mostly dark brown-black SILT, some organics, loose, moist 2.0-2.5: Same as above, but lighter brown 2.5-4.3: Brown-tan-brown poorly graded med SAND, loose	SP	Y	4.2
5-10	OC-SB-508-8.0/10-XX	5.0/3.5	13:40	0-3.5: Brown-red brown dry to brown poorly graded med SAND, uniform, wet @ 9' BGS	SP	Y	6.7
10-14	OC-SB-508-12/14	5.0/3.0	13:50	0-1.3: Same as above 1.3-3.0: Brown-gray brown well graded SAND and GRAVEL, wet, med dense	SM	Y	1.8
				Refusal @ 14' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec

Project:	Olin, Wilmington	Boring:	SB-509
Location:	SB-509	File No.:	
Client:	Olin		

Contractor:	TDS	Drilling Method:	direct push
Operator:	James	Bore Hole ID/OD:	2.25"
Logged By:	DLC	Auger ID/OD:	2.0" x 2.25"
Checked By:	MAM 1/2/17	Sampler:	DCC
Date Start/Finish:	12-13-12 / "	Hammer Wt./ Fall:	/
Boring Location:	509	Water Level[3]:	5 9
Ref. Elevation[1]:	/		

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID
0-5	OC-SB-509-0.0/1.0-XXft	5.0/2.2	13:30	0.0 - 2.2: Brown, poorly graded fine sand and silt	SM	Y	2.7
	OC-SB-509-1.0/3.0-XXft		13:35	Refusal @ 5' BGS		Y	

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec

Project: Olin, Wilmington
Location: SB-510
Client: Olin

Boring: SB-510
File No.:

Contractor: TDS	Drilling Method: direct push		
Operator: James	Bore Hole ID/OD: 2.25"		
Logged By: DLC	Auger ID/OD: 2.0" x 2.25"		
Checked By: MAM 12/13	Sampler: DLC		
Date Start/Finish: 12-13-12 | 12-13-12	Hammer Wt./ Fall: /		
Boring Location: 510	Water Level[3]: ≈ 9'		
Ref. Elevation[1]: /			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Elevation
0	OC-SB-510-			0.0-1.9: Brown, poorly graded fine SAND, loose, moist	SM	Y	
1	0.0/1.0-ft	5.0/	12:55				
		2.7		1.9-2.7: Grey, poorly graded GRAVEL, some sand			
5							
5				0.0-1.6: Same as 1.9-2.7 above but wet	SM	Y	
1	OC-SB-510-	5.0/					
	7.0/9.0-ft	2.0/	13:00				
10	4.0/2.0			1.6-2.0: Same as 0.0-1.9 above, but wet			
9							
				Refusal @ 9' BGS			

Notes

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amec

Project: olin, wilmington
Location: SB-511
Client: olin

Boring: SB-511
File No.:

Contractor: TDS	Drilling Method: Direct Push
Operator: James	Bore Hole ID/OD: 2.25"
Logged By: DLC	Auger ID/OD: 2.0" / 2.25"
Checked By: 1/2/13	Sampler: NSD
Date Start/Finish: 12-10-12 / "	Hammer Wt./ Fall: /
Boring Location: SB-511	Water Level[3]: ≈15' BGS
Ref. Elevation[1]: /	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
wob = weight of 140lb hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID / Elevation
0-5	oc-SB-511-0.0/5.0-xx4	5.0/3.3	11:00	0-0.4: Layer of asphalt (0-0.2) some rock frags. Mostly brown, poorly graded SAND, loose, dry 0.4-1.6: Mostly brown, poorly graded med SAND GRAVEL	SM	Y	60.1
				1.6-1.8: Black gravel and SAND 1.8-3.3: Mostly gray, med. poorly graded SAND, loose, dry	SM		60.1
5-10	oc-SB-511-6.0/8.0-xx4	5.0/2.8	11:20	0-0.6: Same as 1.8-3.3 above 0.6-2.8: Mostly brown, tan-reddish tan fine well graded SAND and GRAVEL, some cobbles, loose, dry	SM	Y	60.1
10-15	oc-SB-511-11/13-xx4	5.0/2.0	11:45	0-2.0: Same as above but brown, wet Refusal @ 15' BGS	SM	Y	60.1

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec

Project: olin, Wilmington
Location: SB-512
Client: olin

Boring: SB-512
File No.:

Contractor: TDS		Drilling Method:	Direct Push
Operator: James		Bore Hole ID/OD:	2.25"
Logged By: DLC		Auger ID/OD:	2.0"/2.25"
Checked By: MAM 1/2/13		Sampler:	NSD
Date Start/Finish: 12-10-12		Hammer Wt./ Fall:	/
Boring Location: SB-512		Water Level[1]:	≈14' BGS
Ref. Elevation[1]: /			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID ~~Elevation~~
0-5	OC-SB-512-0.0/1.0-xxx	5.0/3.1	12:40	0-0.2: Asphalt 0.2-3.1: Mostly brown, poorly graded med-fine SAND, loose, dry	SP	Y	<0.1
5-10	OC-SB-512-0.0/8.0-xxx	5.0/2.4	12:45	0.0-2.4: Same as above, but some coarse sand, dark (black layer @ 0.2-0.4	SP	Y	<0.1
10-15	OC-SB-512-13/15-xxx	5.0/4.3	13:05	0-4.3: Mostly brown, well graded, med-coarse GRAVEL and SAND, ~~damp~~, wet	~~SW~~ SM	Y	<0.1
				refusal @ 15' BGS			

Notes

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amec

Project: Olin, Wilmington		Boring: SB-513
Location: SB-513		File No.:
Client: Olin		

Contractor: TDS	Drilling Method: direct push
Operator: James	Bore Hole ID/OD: 2.25"
Logged By: DLC	Auger ID/OD: 2.0 / 2.25"
Checked By: MAM 1/2/13	Sampler: DLC
Date Start/Finish: 12-12-12 / 12	Hammer Wt./ Fall:
Boring Location: SB-513	Water Level[3]: ±10' BGS
Ref. Elevation[1]:	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140lb hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Elevation @
0 - 5	oc-SB-513-0.0/1.0-xxx	5.0/2.9	8:20	0.0-0.2: Topsoil/ grass 0.2-0.7: Brown, light brown poorly graded med-coarse SAND, some gravel, loose, dry 0.7-2.0: Black-gray poorly graded med SAND, uniform, loose, moist	SP SM	Y	2.8
				2.0-2.7: Brown SILT/ ORGANICS, moist 2.7-2.9: Brown, gray poorly graded med coarse SAND, damp			-
5 - 10	oc-SB-513-7.0/9.0-xxx	5.0/3.0	8:25	0.0-2.4: Brown-light brown poorly graded med SAND, some coarse sand, loose, uniform, damp 2.4-3.0: Gray ROCK FRAGS, some gravel, some sand, loose, wet	SM	Y	2.6
10 - 12	oc-SB-513-10/12-xxx	2.0/1.3	8:30	0.0-0.8: Same as 2.4-3.0 above 0.8-1.3: Mostly brown SAND and SILT, wet Refusal @ 12' BGS	SM	Y	2.4

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec

Project: olin. wilmington Location: SB-514 Client: olin	Boring: SB-514	File No.:

Contractor:	TDS	Drilling Method:	direct push
Operator:	James	Bore Hole ID/OD:	2.25"
Logged By:	DLC	Auger ID/OD:	2.0 x 2.25"
Checked By:	MAM 1/2/13	Sampler:	DLC
Date Start/Finish:	12-12-12 / "	Hammer Wt./ Fall:	/
Boring Location:	SB-514	Water Level[3]:	≈15' BGS
Ref. Elevation[1]:	/		

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID ~~Elevation~~
0-5	OC-SB-514-0.0/1.0-xxx	5.0/2.9	8:50	0.0-0.2: Asphalt 0.2-2.9: Brown-dark brown-brown poorly graded med SAND, uniform, moist	SP	Y	1.1
5-10	OC-SB-514-7.0/9.0-xxx	5.0/3.9	9:00	0.0-1.4: Brown, poorly graded med-coarse SAND, uniform, damp 1.4-3.9: Gray-brown-gray-brown	SP SP	Y	1.6
10-15		5.0/4.3		0.0-3.4: Gray, poorly graded med SAND, uniform, wet. 3.4-4.3: Brown, well graded SAND some gravel, some cobbles	SM	N	1.3
15-20	OC-SB-514-~~17/19~~-xxx 15/17	5.0/2.6	9:20	0.0-2.6: Brown-reddish brown well graded SAND, some gravel, some cobbles, wet	SW	Y	1.3
20-21				Refusal @ 20.5' BGS 20-21: No recovery.			
				~~DUP-4 coll.~~ ~~DUP-4 c~~			

Notes

DUP-4 collected from 7-9' interval

xMS/MSD collected from 15-17' interval

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amec

Project:	olin, Wilmington	**Boring:**	SB-515
Location:	SB-515	**File No.:**	
Client:	olin		

Contractor:	TDS	Drilling Method:	direct push
Operator:	James	Bore Hole ID/OD:	2.25"
Logged By:	DLC	Auger ID/OD:	2.0 x 2.25"
Checked By:	MAM 1/2/12	Sampler:	DLC
Date Start/Finish:	12-12-12	Hammer Wt./ Fall:	
Boring Location:	SB-515	Water Level[3]:	≈15' BGS
Ref. Elevation[1]:			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	~~Elevation~~ PID DLC
0-5	OC-SB-515-0.0/1.0-XXX	5.0/2.6	10:05	0.0-0.2: Asphalt 0.2-1.2: Brown, poorly graded med SAND, some fine sand 1.2-1.6: Brown-black SAND and SILT, moist, uniform	SM	Y	0.2
5-10	OC-SB-515-6.0/8.0-XXX	5.0/3.6	10:20	1.6-2.6: Brown poorly graded med-fine SAND, uniform, moist 0.0-3.6: Brown-gray-brown poorly graded med SAND, damp	SP	Y	0.4
10-15	OC-SB-515-13/15-XXX	5.0/4.8	10:45	0.0-1.3: Gray-brown-gray well graded SAND, some gravel, some cobbles 1.3-1.8: Gray cobbles, subrounded 0.5" diameter	SM		0.4
15-19		4.0/1.4		1.8-4.8: Gray-brown poorly graded med SAND, some coarse sand, wet Brown, well graded SAND, wet	SW	Y	0.3
				Refusal @ 19' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec

Project: alin wilmington
Location: SB-516
Client: alin

Boring: SB-516
File No.:

Contractor: TDS	Drilling Method: direct push		
Operator: James	Bore Hole ID/OD: 2.25"		
Logged By: DLC	Auger ID/OD: 2.0 x 2.25"		
Checked By: MAM 1/2/13	Sampler: DLC		
Date Start/Finish: 12-12-12 / 1	Hammer Wt./ Fall:		
Boring Location: 516	Water Level[3]: ≈ 15 BGS		
Ref. Elevation[1]:			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140lb hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Elevations[2]
0 - 5	oc-SB-516-0.0/1.0-xxx	5.0/2.3	11:10	0 - 0.3 : topsoil 0.3 - 1.9: Dark brown SILT, uniform same organics, some sand 1.9 - 2.3: Same as above, but brown; more sand	SM	Y	3.1
5 - 10	oc-SB-516-5.0/6.0-xxx	5.0/3.8	11:25	0.0-1.4: Brown poorly graded med SAND 1.4 - 3.8 : Gray, poorly graded med - coarse SAND, uniform, wet	SP	Y	1.3
10 - 15		5.0/4.7		0 - 4.7 : Brown - gray, poorly graded med - coarse SAND; wet	SP	Y (GB)	1.6
15 - 20	oc-SB-516-15/17-xxx	5.0/4.3	11:40	0.0 - 0.9: Same as above 0.9 - 1.1 : Cobbles, 1" in diameter 1.1 - 1.9: Gray, poorly graded SAND, wet	SM	Y	1.3
				1.9 - 2.1 : Same as above, but brown, Some fine sand 2.1 - 3.8 : Brown, poorly graded med SAND, wet	—	—	
				3.8 - 4.8 : Brown, well graded SAND, some cobbles and gravel Refusal @ 20' BGS	—	—	

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec	Project: olin, wilmington Location: SB-517 Client: olin	Boring: SB-517 File No.:

Contractor: TDS	Drilling Method: direct push
Operator: James	Bore Hole ID/OD: 2.25"
Logged By: DLC	Auger ID/OD: 2.0 x 2.25"
Checked By: MAM 1/2/13	Sampler: DLC
Date Start/Finish: 12-12-12 | 11	Hammer Wt./ Fall: /
Boring Location: 517	Water Level[3]: ≈ 15 BGS
Ref. Elevation[1]: /	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
wob = weight of 140lb hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Readings (ppm)
0 1 5	oc-SB-517- 0.0|1.0-ftt	5.0| 3.6	12:15	0 - 0.2: Asphalt 0.2 - 0.6: Brown, poorly graded fine - med SAND 0.6 - 0.8: Black SILT, some fine sand 0.8 - 3.5: Brown poorly graded med - fine SAND	SM	Y	18.2
5 1 10	oc-SB-517- 6.0|8.0-ftt	5.0| 3.3	12:20	0.0 - 1.9: same as above 1.9 - 2.1: Tan cobbles. 1.0" in diameter 2.1 + 3.3: Brown, poorly graded med - coarse SAND, wet	SM	Y	0.8
10 1 15		5.0| 3.4		0 - 3.4: Mostly brown - gray well graded SAND, some gravel wet.	SW	N	4.5
15 1 20	oc-SB-517- 12|20	5.0| 4.5	12:40	Same as above, but brown (0 - 3.8) 3.8 - 4.5: well Gray, ~~poorly~~ graded SAND, some gravel, wet	SW	Y	1.5
20 1 24		~~4.0~~ 4.0| 3.8		0 - 2.4: Gray well graded GRAVEL, some sand, wet 2.4 - 3.8: Brown, poorly graded med SAND, wet	GM	—	1.5
				Refusal @ 24' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec

Project: alin, wilmington
Location: SB-518
Client: alin

Boring: SB-518
File No.:

Contractor: TDS	Drilling Method: direct push
Operator: James	Bore Hole ID/OD: 2.25"
Logged By: DLL	Auger ID/OD: 2.0" & 2.25"
Checked By: MAW 1/2/13	Sampler: DLL
Date Start/Finish: 12-4-12	Hammer Wt./ Fall: /
Boring Location: SB-518	Water Level[3]: ± 7'
Ref. Elevation[1]: /	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p' = Unconfined Compressive Strength (psf)
wob = weight of 140lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Elevation
0	oc-SB-518-0.0/1.0-xxx	5.0/1.1	9:55	0.0-0.3: Gray-brown cobbles, gravel and sand, moist 0.3-1.1: Brown, poorly graded SAND, damp, uniform	SM SP	Y	/ 0.2
5	oc-SB-518-5.0/10-xxx	5.0/3.9	10:05	0.0-1.1: Brown, SAND and ORGANICS uniform, wet 1.1-3.9: Brown-gray brown med-coarse SAND	SP	Y	0.4 /
10	oc-SB-518-10/15-xxx	5.0/1.7	10:15	0.0-1.7: Gray, well graded SAND and GRAVEL mixture, loose	SM	Y	0.4 /
				Refusal @ 15' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: SB-518

amec

Project: din, Wilmington
Location: SB-519
Client: din

Boring: SB-519
File No.:

Contractor: TDS	Drilling Method: direct push	
Operator: James	Bore Hole ID/OD: 2.25"	
Logged By: DLL	Auger ID/OD: 2.0" x 2.25"	
Checked By: MAM 1/2/13	Sampler: DLL / NSD	
Date Start/Finish: 12-14-12 / "	Hammer Wt./ Fall: /	
Boring Location: SB-519	Water Level[3]: ± 6'	
Ref. Elevation[1]: /		

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140lb hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Elevation
0 1 5	cc-SB-0.0/10 - XRF	5.0/ 1.9	9:00	0.0-1.3: Brown, poorly graded med SAND, some fines, damp 1.3-1.9: Brown organics, wet, uniform	SP SM OL	Y	/ 1.6
5 1 10	cc-SB-8.0/10 - XRF	5.0/ 4.3	9:20	0.0-1.9: Same as 1.3-1.9 above, 1.9-4.3: Brown, poorly graded, med SAND, wet, loose	CL SP	Y	12.5 /
10 1 15	cc-SB-12/14 - XRF	5.0/1.2 9:40	9:40	0.0-0.8: Gray, poorly graded, med-coarse SAND, wet, 0.8-1.2: Gray cobbles, rock frags, loose, wet.	SM CM	Y	1.2 /
				Refusal @ 15' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: SB-519

amec

Project: olin, Wilmington
Location: SB-520
Client: olin

Boring: SB-520
File No.:

Contractor: TDS	Drilling Method: direct push		
Operator: James	Bore Hole ID/OD: 2.25"		
Logged By: DLL	Auger ID/OD: 2.0" x 2.25"		
Checked By: MAM 1/2/13	Sampler: DLL / wsb		
Date Start/Finish: 12-13-12/n	Hammer Wt./ Fall: /		
Boring Location: SB-520	Water Level[3]: ± 10		
Ref. Elevation[1]: /			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Reading (ppm)
0 to 5	oc-SB-520-0.0/1.0-AA	5.0/2.9	8:10	0.0-0.2: Topsoil 0.2-1.2: Brown-dark brown silt and sand, moist 1.2-2.1: Gray-brown silt, sand and rock frags, dry, loose	SM	Y	0.3
				2.1-2.9: Brown, poorly graded med SAND, loose, moist			
5 to 10	oc-SB-520-8.0(10-AA	5.0/3.3	8:40	0.0-0.3: Same as 2.1-2.9 above 0.3-1.2: Brown-gray rock frags cobbles and sand, loose dry 1.2-3.3: Brown w/ well graded SAND and GRAVEL, wet, loose	SM	Y	0.3
10 to 15		5.0/3.4		0-3.4: Same as 1.2-3.3 above	SM	N	0.4
15 to 20	oc-SB-520-18(20-AA	5.0/4.5	8:50	0.0-2.4: Brown, poorly graded coarse SAND, some gravel, wet, loose 2.4-4.5: Gray, poorly graded fine SAND and SILT, wet, dense	SM	Y	0.9
20 to 23		5.0/1.5		0.0-1.5: Same as 2.4-4.5 above Refusal @ 23' BGS	SM	N	0.9

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec

Project: Olin, Wilmington
Location: SB-521
Client: Olin

Boring: SB-521
File No.:

Contractor: TDS	Drilling Method: direct push	Definitions:	
Operator: James	Bore Hole ID/OD: 2.25"	S = Split Spoon Sample	
Logged By: DLC	Auger ID/OD: 2.0 x 2.25"	U = Thin Wall Tube Sample	
Checked By: MAM 1/2/13	Sampler: DLC	R = Rock Core Sample	
Date Start/Finish: 12-14-12	Hammer Wt./ Fall: ✓	V = Insitu Vane Shear Test	
Boring Location: SB-521	Water Level[3]: ≈ 13 'BGS	q_p = Unconfined Compressive Strength (psf)	
Ref. Elevation[1]: ✓		woh = weight of 140 lb hammer	
		wor = weight of rods	
		wc = Water Content, percent	
		oc = Organic Content, percent	

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Elevation
0 - 5	OC-SB-521-0.0-11.0-XX4	5.0' / 3.3	8:10	0.0 - 3.3: Brown, organics, some roots, uniform, wet	OL	Y	0.4
5 - 10	OC-SB-521-8.0-10-XX4	5.0' / 3.5	8:20	0.0 - 1.4: Same as above 1.4 - 3.5: Brown - light brown poorly graded med SAND, uniform, wet.	SP	Y	6.4
10 - 15	✓	✓	✓	No recovery 0.0-1.4	✓	✓	✓
15 - 20 (18)	OC-SB-521-16/18-XX4	3.0' / 1.4	8:45	Grey/Brown well graded SAND and GRAVEL, wet	SM	Y	0.0
				Refusal @ 18' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

11.6
12.5
4.2

amec

Project: olin, wilmington
Location: SB-522
Client: olin

Boring: SB-522
File No.:

Contractor: TDS	Drilling Method: direct push		
Operator: Jame S	Bore Hole ID/OD: 2.25"		
Logged By: DLC	Auger ID/OD: 2.0" x 2.25"		
Checked By: MAM 1/2/10	Sampler: DLC		
Date Start/Finish: 12-13-12 / "	Hammer Wt./ Fall: /		
Boring Location: SB-522	Water Level[3]: ∑ 13' BGS		
Ref. Elevation[1]: /			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Elevation
0				0-0.2: Topsoil / organics			
1	OC4	5.0/					
5	OC-SB-522-	1.3	9:20	0.2-1.3: Brown, poorly graded med-fine SAND, layer of rock frags @ 0.8 and 1.0	SP	Y	0.3
	0.0/1.0-XR4						
5				0.0-1.2: Brown poorly graded med-fine SAND, loose, wet			
1	OC-SB-522-	5.0/				Y	1.5
10	8.0/10-XR4	3.3	9:40	1.2-1.4: Layer of dark brown organics			
				1.4-3.3: Brown, poorly graded med-coarse SAND, wet, loose			
10							
1		5.0/					
15		2.8		0.0-2.8: Brown, poorly graded med SAND, some fine SAND, uniform, layer of red-brown sand at 0.8		N	1.2
15							
1	OC-SB-522-	5.0/	9:50	0.0-0.6: Gray/tan cobbles/ rock frags, loose, wet		Y	0.3
17	13/15-XR4	0.6					
				Refusal @ 17' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: 522

amec

Project: a.i.n. wilmington
Location: SB-523
Client: a.i.n

Boring: 523
File No.:

Contractor: TDS	Drilling Method: direct push
Operator: James	Bore Hole ID/OD: 2.25"
Logged By: DLC	Auger ID/OD: 2.0x2.95"
Checked By: MAM 1/2/13	Sampler: DLC
Date Start/Finish: 12-12-12	Hammer Wt./ Fall: /
Boring Location: SB-523	Water Level[3]: ≈15' BGS
Ref. Elevation[1]: /	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID / Elevation
0 to 5	oc-SB-523-0.0|1.0-xxx+	5.0| 2.5	13:45	0.0 - 0.2: topsoil 0.2 - 0.6: Gray - tan rock frags/ concrete/ cobbles 0.6 - 1.4: Gray - brown med poorly graded SAND damp	SM	Y	1.2
5 to 10	oc-SB-523-6.0|8.0-xxx+	5.0| 3.5	13:50	1.4 - 2.5: Gray cobble/ rock frags - Mixture, some sand - 0.0 - 0.5: Brown poorly graded med SAND, some gravel, some cobbles, dry	SM	Y	0.7
				0.5 - 3.1: Gray - tan rock frags/ cobbles, loose, dry 3.1 - 3.5: Brown, ~~well~~ well graded ~~GRAVEL~~ GRAVEL, ~~some~~ coarse sand, some wet.	GM		
10 to 15		5.0| 2.3		0.0 - 2.3: Same as 3.1 - 3.5 above	GW	N	11.7
15 to 20		5.0| 3.5		0.0 - 3.5: Same as above	GW	N	~~0.4~~ 22.7
20 to 24	oc-SB-523-22|24-xxx+	5.0| 3.0	14:10	0.0 - 1.9: Same as above 1.9 - 3.0: Brown - gray poorly graded coarse SAND wet	SP	Y	1.9

Notes

Refusal @ 24' BGS

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec

Project: olin, wilmington
Location: SB-524
Client: olin

Boring: SB-524
File No.:

Contractor: TDG	Drilling Method: direct push		
Operator: James	Bore Hole ID/OD: 2.25"		
Logged By: DCC	Auger ID/OD: 2.0" x 2.25"		
Checked By: MAM 1/21/13	Sampler: DCC		
Date Start/Finish: 12-12-12 | 11	Hammer Wt./ Fall: —		
Boring Location: 524	Water Level[3]: ~15 BGS		
Ref. Elevation[1]: —			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
wob = weight of 140lb hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Elevation
0 to 5	OC-SB-524-0.0(1.0-XXX)	5.0/2.6	13:10	0 - 0.3: Brown topsoil / silt 0.3 - 0.5: Brown - grey silt and fine sand 0.5 - 0.9: Brown poorly graded med SAND, some fines	SM	Y	0.7
5 to 10				0.9 - 1.1: Grey cobble, 1.0" diameter 1.1 - 2.1: Brown med poorly graded SAND, damp 2.1 - 2.6: Brown, well graded	SM	—	0.6
5 to 10	OC-SB-524-5.0(10-XXX)	5.0/2.6	13:20	SAND, some gravel, damp 0 - 2.4: Grey - orange gravel + cobbles 1.0" max, loose, dry 2.4 - 2.8: Brown, well graded	GM	Y	0.9
10 to 15		5.0/3.6		GRAVEL, some coarse sand, damp, loose 0.0 - 3.6 Same as 2.4 - 2.8 above	GW	N	1.2
15 to 20		5.0/2.3		0 - 2.3: Same as above	GW	N	1.0
20 to 25		5.0/4.6		0.0 - 1.2: Same as above 1.2 - 3.1: Grey, poorly graded fine gravel, some coarse sand, wet 3.1 - 4.6: Grey - brown poorly graded med SAND wet	GM SM	N	0.9

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec

Project: olin, wilmington
Location: SB-524
Client: olin

Boring: SB-524
File No.:

Contractor: FDS	Drilling Method: direct push	**Definitions:**	
Operator: James	Bore Hole ID/OD: 2.25"	S = Split Spoon Sample	
Logged By: DLC	Auger ID/OD: 2.0x2.25"	U = Thin Wall Tube Sample	
Checked By: MAM 1/2/17	Sampler: DLC	R = Rock Core Sample	
Date Start/Finish: 12-12-12/11	Hammer Wt./ Fall: /	V = Insitu Vane Shear Test	
Boring Location: 524	Water Level[3]: ≈15' BGS	q_p = Unconfined Compressive Strength (psf)	
Ref. Elevation[1]: /		wob = weight of 140lb hammer	
		wor = weight of rods	
		wc = Water Content, percent	
		oc = Organic Content, percent	

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Elevation
25	oc-SB-524-			0.0 - 1.7: Gravelly fine poorly graded coarse SAND, some med sand, loose, wet	SP	Y	0.7
1	27/29-xxx	4.0'	13:30				
29		1.7					
				Refusal @ 29' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec

Project: Olin, Wilmington
Location: SB-525
Client: Olin

Boring: SB-525
File No.:

Contractor: TDS	Drilling Method: direct push		
Operator: James	Bore Hole ID/OD: 2.25"		
Logged By: DLC	Auger ID/OD: 2.0" x 2.25"		
Checked By: MAM 11/2/13	Sampler: DLC		
Date Start/Finish: 12-18-12 / "	Hammer Wt./ Fall: /		
Boring Location: 525	Water Level[3]: ±10' BGS		
Ref. Elevation[1]: /			

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Elevation
0				0.0-0.2: Topsoil			
1	cc-SB-525-	5.0'	11:00	0.2-1.9: Brown, poorly graded med-fine SAND, some organics, some cobbles	SM	Y	2.0
5	0.0/1.0-xxx	3.9				Y	
				1.9-2.4: Gray SILT, loose, damp			
	cc-SB-525-3.0/5.0-xxx		11:20				
				2.4-2.8: Same as 0.2-1.9			
				2.8-3.9: Black-brown SILT and fine SAND; layer of rock frags @ 2.9', loose, damp			
5		5.0'		0.0-0.2: Brown-dark brown SILT, moist			
1		4.1		0.2-4.1: Brown; poorly graded med-fine SAND; damp, uniform	SP	N	1.6
10							
10		5.0'		0.0-4.2: Same as 0.2-4.1 above, but wet			
1		4.2			SP	N	2.4
15							
15							
1	cc-SB-525-	5.0'	11:45	0.0-2.9: Brown-gray poorly graded SAND and GRAVEL, wet, loose	SM	Y	2.0
20	18/20-xxx	2.9					
				Refusal @ 20' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring: 525

amec

Project: Olin, Wilmington
Location: SB-532
Client: Olin

Boring: SB-532
File No.:

Contractor: TDS	Drilling Method: direct push	**Definitions:**	
Operator: James	Bore Hole ID/OD: 2.25"	S = Split Spoon Sample	
Logged By: DLL	Auger ID/OD: 2.0" x 2.25"	U = Thin Wall Tube Sample	
Checked By: MAM 1/2/13	Sampler: DLL	R = Rock Core Sample	
Date Start/Finish: 12-18-12 / 19	Hammer Wt./ Fall:	V = Insitu Vane Shear Test	
Boring Location: SB-532	Water Level[3]: ~ 11' BGS	q_p = Unconfined Compressive Strength (psf)	
Ref. Elevation[1]:		wob = weight of 140 lb. hammer	
		wor = weight of rods	
		wc = Water Content, percent	
		oc = Organic Content, percent	

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Elevation
0	oc-SB-532-			0.0 - 0.2 : Asphalt			
1	0.0/1.0-XX+	3.0/	14:40	0.2 - 1.6: Brown-reddish brown med poorly graded SAND some gravel, some rock frags	SM	Y	2.4
5		3.3					
				1.6 - 3.3: Brown - tan poorly graded med SAND, some fines			
5							
1	oc-SB-532-	5.0/		0.0 - 3.5 : Brown - grey poorly			
10	6.0/8.0-XX+	3.5	14:45	graded med SAND, uniform	SP	Y	1.9
10		3		0.0 - 0.4: Same as above			
1	oc-SB-532-	3.0/		0.4 - 1.9 : Brown, med dense,			
13	11/13-XX+	1.9	14:50	non-plastic SILT, wet.	SM	Y	1.4
				Refusal @ 13' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec

Project: Olin, Wilmington		Boring: SB-533
Location: SB-533		File No.: SB-533
Client: Olin		

Contractor: TDS	Drilling Method: direct push
Operator: James	Bore Hole ID/OD: 2.25"
Logged By: DL	Auger ID/OD: 2.0" x 2.25"
Checked By: MAM 1/2/13	Sampler: DL
Date Start/Finish: 12-13-12/11	Hammer Wt./ Fall: /
Boring Location: 533	Water Level[3]: ± 10' BGS
Ref. Elevation[1]: /	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID Reading
0							
1	oc-SB-533	5.0/	14:00	0.0-3.3: Brown, poorly graded med SAND, some silt	SP	Y	3.5
5	-0.0/1.0	3.3					
5							
	oc-SB-						
1	533-6.0/8.0	-5.0/	14:20	0.0-4.2: Same as above,	SP	Y	2.0
10	xxx	4.2					
10							
1	oc-SB-533-	5.0/		0.0-3.5: Gray, poorly graded med SAND, wet, uniform			
15	13/15-xxx	3.5	14:30		SP	Y	1.1
				Refusal @ 15' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec

Project: ain, wilmington
Location: SB-534
Client: ain

Boring: SB-534
File No.:

Contractor: TDS
Operator: James
Logged By: DLL
Checked By: MAM 1/2/13
Date Start/Finish: 12-13-12/11
Boring Location: 534
Ref. Elevation[1]:

Drilling Method: direct push
Bore Hole ID/OD: 2.25"
Auger ID/OD: 2.0" x 2.25"
Sampler: DLL
Hammer Wt./ Fall:
Water Level[3]: 3.9' BGS

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
wob = weight of 140lb hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation PID
0 1.5	oc-SB-534-0.0/1.0-XRF	5.0/2.7	15:05	0.0-0.2: Asphalt 0.2-0.5: Dark brown SAND and SILT, loose, dry 0.5-1.5: Brown, SAND and GRAVEL some fines	SM	Y	1.6
				1.5-2.7: Brown-light brown poorly graded med-fine SAND, dry, loose	SP		
5 9	oc-SB-534-7.0/9.0-XRF	5.0/2.7	15:10	0.0-2.7: Light brown-brown, poorly graded med SAND, damp, loose	SP	Y	1.3
				Refusal @ 9' BGS			

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec

Project: Olin, Wilmington
Location: Wilmington, MA
Client: Olin

Boring: SB-530
File No.: /

Contractor: /	Drilling Method: /	**Definitions:**	
Operator: /	Bore Hole ID/OD: /	S = Split Spoon Sample	
Logged By: DLC	Auger ID/OD: /	U = Thin Wall Tube Sample	
Checked By: DLC NJD	Sampler: DLC	R = Rock Core Sample	
Date Start/Finish: 6-17-13 / 11	Hammer Wt./ Fall: /	V = Insitu Vane Shear Test	
Boring Location: SB-530	Water Level[3]: /	q_u = Unconfined Compressive Strength (psf)	
Ref. Elevation[1]: /		woh = weight of 140 lb. hammer	
		wor = weight of rods	
		wc = Water Content, percent	
		oc = Organic Content, percent	

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0				Note: See previous log for SB-530 for 0-3.5' description			
1							
3.5	/	/	~~1414~~		SM		
			1414	0.0-3.5: Brown-light brown poorly graded med SAND. damp			
3.5	oc-SB-530-3.5/4.0-XXF	/	1414	3.5-4.0: same as above, but more damp	SM	Y	
4.0							

Notes

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

amec

Project:	alin, Wilmington
Location:	wilmington, MA
Client:	alin
Boring:	SB-535
File No.:	/

Contractor:	/
Operator:	/
Logged By:	DLC
Checked By:	NSD
Date Start/Finish:	6-17-13 / "
Boring Location:	SB-535
Ref. Elevation[1]:	/
Drilling Method:	/
Bore Hole ID/OD:	/
Auger ID/OD:	/
Sampler:	DLC
Hammer Wt./ Fall:	/
Water Level[3]:	/

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
woh = weight of 140 lb hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0	oc-SB-535-			Same as SB-536 Cno asphalt	SM	Y	
1	2.5(3.0-	/	14:00				
2	xxx						
3.0							
3				Same as SB-536	SM	Y	
1	oc-SB-535-	/	14:10				
4.0	3.5(4.0-xxx						

Notes

Approx 2" diameter metal pipe uncovered during hand-digging at location at approx 2.5' BGS. Photo taken

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Boring: 535

amec

Project: Olin, Wilmington
Location: SB-536
Client: Olin

Boring: 536
File No.: /

Contractor: /	Drilling Method: /	**Definitions:**	
Operator: /	Bore Hole ID/OD: /	S = Split Spoon Sample	
Logged By: DLC	Auger ID/OD: /	U = Thin Wall Tube Sample	
Checked By: MJD	Sampler: DLC	R = Rock Core Sample	
Date Start/Finish: 6-17-13 / " "	Hammer Wt./ Fall: /	V = Insitu Vane Shear Test	
Boring Location: SB-536	Water Level[3]: /	q_u = Unconfined Compressive Strength (psf)	
Ref. Elevation[1]: /		woh = weight of 140 lb. hammer	
		wor = weight of rods	
		wc = Water Content, percent	
		oc = Organic Content, percent	

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation (DS)
0	OC-SB-536-						
1	0.0 | 1.0	N/A	12:00	Mostly brown - light brown SAND and SILT. Dry, some organics, some asphalt, some gravel / cobbles	SM	Y	
1	x = x						
1	OC-SB-536-						
1	2.5 | 3.0	N/A	12:25	1 - 1.7: Brown - dark brown loamy SILT and SAND, some gravel/ cobbles, poorly graded	SM	Y	
3				1.7 - 2.2: Reddish brown fine SAND, some silt, some cobbles			
				2.2 - 3.0: Light brown, poorly graded medium SAND loose, dry	SM		
3							
1	OC-SB-536-			Same as above, but damp	SM	Y	
4	3.5 | 4.0	N/A	12:40				

Notes

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amec

Project: Olin, Wilmington
Location: SB-537
Client: Olin

Boring: SB-537
File No.: /

Contractor: /	Drilling Method: /
Operator: /	Bore Hole ID/OD: /
Logged By: DLC	Auger ID/OD: /
Checked By: NJD	Sampler: DLC
Date Start/Finish: 6-17-13 / "	Hammer Wt./ Fall: /
Boring Location: SB-537	Water Level[3]: /
Ref. Elevation[1]: /	

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_u = Unconfined Compressive Strength (psf)
wob = weight of 140lb hammer
wor = weight of rods
we = Water Content, percent
oc = Organic Content, percent

Depth	Sample Information: Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	Elevation
0							
1	OC-SB-537-0.0|1.0-xxx	/	15:30	Gray-tan poorly graded SAND, some fines, some gravel	SM	Y	
	MS/MSD and DUP collected						
1							
2.5	OC-SB-537-2.5|3.0-xxx	/	15:50	Brown-red brown poorly graded med SAND, damp some gravel, cobbles	SM	Y	
3.0							
3.5	OC-SB-537-3.5|4.0-xxx	/	16:00	Same as above	SM	Y	
4.0							

Notes

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Boring: SB-537

amec

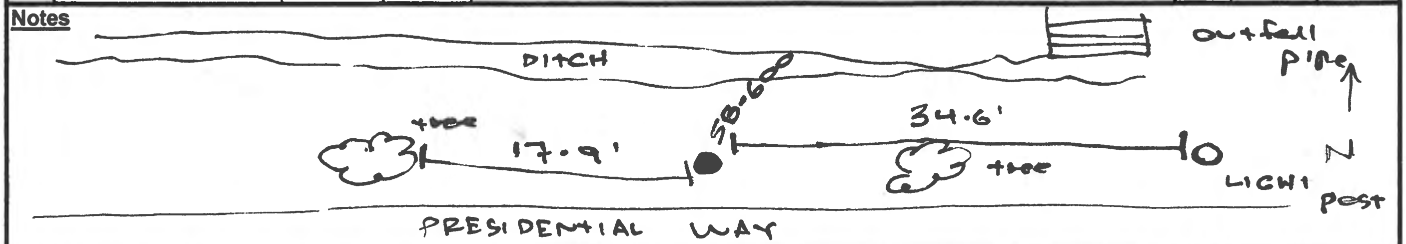
Project:	olin, Wilmington
Location:	~~olin~~, Wilmington, MA
Client:	olin
Boring:	SB-600
File No.:	

Contractor:	CDS / Boart	Drilling Method:	Pre-vac / Sonic
Operator:	J. Graglia	Bore Hole ID/OD:	6"
Logged By:	DLC	Auger ID/OD:	6" casing / 4.75" core barrel
Checked By:	MAM 9-5-13	Sampler:	DLC
Date Start/Finish:	3-6-13 / "	Hammer Wt./ Fall:	/
Boring Location:	SB-600	Water Level[3]:	≈ 9'
Ref. Elevation[1]:	Presidential Way		

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID ~~Elevation~~
0 1 5	Pre-vac	/	13:00	0-5: Brown fine SAND, some silt, some cobbles from 4-5, loose, dry (FILL)	FILL	N	<0.1 ~~<0.1~~
5 / 6		5.0 / 3.9	13:50	0-0.6: Brown fine SAND, some silt, dry. 0.6-1.1: Tan med-coarse SAND and GRAVEL, some cobbles, dry	SP / SM	Y xx @ 14:30 [illegible]	<0.1 <0.1
10				1.1-2.1: Dark brown fine SAND and organic SILT, some wood frags, damp. 2.1-3.9: Brown, poorly graded med SAND, wet	OL / SP		<0.1 1.3
15		5.0 / 3.9	14:40	0-3.9: Brown, med SAND, poorly graded, transitions to tan @ 2.6	SP		<0.1
20		5.0 / 4.1	14:45	0-2.0: Same as 0-3.9 above. 2.0-3.0: Brown-red brown coarse SAND and GRAVEL, wet. 3.0-4.1: Same as above, but gray	SP / SM		1.4
				End of boring: 20' BGS			

Notes



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Project:	Olin, Wilmington
Location:	~~SB-601~~ (Wilmington, MA)
Client:	Olin
Boring:	SB-601
File No.:	

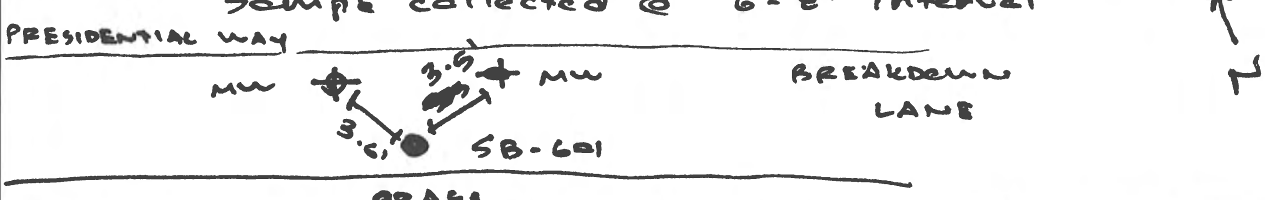
Contractor:	CDS / Boart Longyear	Drilling Method:	Pre-vac / Sonic
Operator:	J. Gruglia	Bore Hole ID/OD:	6"
Logged By:	DLE	Auger ID/OD:	6" casing 4 3/4" core barrel
Checked By:	4-5-13 MAM	Sampler:	DLE
Date Start/Finish:	3-6-13 / "	Hammer Wt./ Fall:	—
Boring Location:	Presidential Way	Water Level[3]:	~ 8'
Ref. Elevation[1]:	—		

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
wc = Water Content, percent
oc = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID ~~Elevation~~
0 – 5	Pre-vac	—	11:20	0-0.9: Asphalt and large rock frags / cobbles 0.9-1.5: Brown fine SAND, some silt, moist, (FILL) 1.5-5.0: Gray, rock frags / cobbles loose, 6" max in diameter (FILL) (4 layers of asphalt)	FILL	N	<0.1
5 – 10		5.0 / 4.1	12:05	0.0-1.0: Brown SAND and SILT, some gravel / cobbles, moist 1.0-1.3: Same as above, but more cobbles / rock frags, dry 1.3-2.4: Dark brown organic SILT, some wood / plant frags, damp 2.4-2.8: Brown med SAND, damp 2.8-4.1: Gray rock frags and SAND wet.	(SM) SM OL SP SM	Y (6-8' @ 12:30)	19.5 5.2 0.5 0.5 0.2
10 – 15		5.0 / 1.9	12:15	0-1.9: Gray med-coarse SAND ~~and~~ GRAVEL, some cobbles wet	SM		5.3 0.6
15 – 20		5.0 / 3.8	12:25	0-3.8: Gray, SAND and ~~cobbles~~, some rock frags, COBBLES wet	SM		2.3
				End of boring = 20' BGS			

Notes

Sample collected @ 6-8' interval



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amec	Project: Olin, Wilmington Location: Wilmington, MA Client: Olin	Boring: SB-602 File No.:

Contractor: Boart, CDS	Drilling Method: Sonic	**Definitions:** S = Split Spoon Sample U = Thin Wall Tube Sample R = Rock Core Sample V = Insitu Vane Shear Test q_p = Unconfined Compressive Strength (psf) woh = weight of 140 lb. hammer wor = weight of rods wc = Water Content, percent oc = Organic Content, percent
Operator: J. Graglia	Bore Hole ID/OD: 6"	
Logged By: DLC	Auger ID/OD: 6" casing 4.75 core barrel	
Checked By: MAM	Sampler: DLC	
Date Start/Finish: 3-6-13 / 3-7-13	Hammer Wt./ Fall: /	
Boring Location: SB-602	Water Level[3]: ≈ 8'	
Ref. Elevation[1]: /		

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID
0–5	Pre-vac	/	13:50	0-1.2: Brown, med-coarse poorly graded SAND and GRAVEL, some cobbles, damp, loose (FILL)	FILL	N	1.9
5–10	/	5.0/3.6	~~5.0~~ ~~3.6~~ 13:55	0-0.9: Same as above 0.9-2.1: Dark brown ORGANIC SILT, some peat, wood/plant fragments, wet 2.1-3.6: Gray, fine-med poorly graded SAND, uniform, wet	OL SP	OC-SB-602-6.1-7.1 @ 14:10	0.6
10–15	/						
15		5.0/2.8	14:15	0-1.5: Same as 2.1-3.6 above 1.5-2.8: Gray to tan poorly graded med SAND, some rock frags, wet	(SP) ~~SM~~ SP	N	1.2
20		5.0/2.9	14:20	0-0.4: Same as 1.5-2.8 above 0.4-0.6: Same as above, but red 0.6-2.9: Same as above, but grey.			1.1
				End of boring: 20' BGS			

Notes

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amec

Project: Olin, Wilmington	**Boring:** SB-603
Location: Wilmington, MA	**File No.:**
Client: Olin	

Contractor: Boart Longyear CDS	**Drilling Method:** Sonic	**Definitions:**
Operator: J. Graglia	**Bore Hole ID/OD:** 6" casing 4.75" core barrel	S = Split Spoon Sample U = Thin Wall Tube Sample R = Rock Core Sample V = Insitu Vane Shear Test q_p = Unconfined Compressive Strength (psf) woh = weight of 140 lb. hammer wor = weight of rods we = Water Content, percent oc = Organic Content, percent
Logged By: DLC	**Auger ID/OD:** " "	
Checked By: MAM	**Sampler:** DLC	
Date Start/Finish: 3-6-13/3-7-13	**Hammer Wt./ Fall:** /	
Boring Location: SB-603	**Water Level[3]:** ≈ 8'	
Ref. Elevation[1]: /		

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID ~~Elevation~~
0 – 5	Pre-vac	/	11:15	0-5: Brown, poorly graded med SAND and GRAVEL. Some cobbles, loose (FILL)	FILL	N	1.6
5 – 10	/	5.0/3.9	11:50	0-1.9: Brown-gray poorly graded med SAND and GRAVEL, some cobbles, loose, damp 1.9-2.3: Brown-red brown med SAND and ORGANICS, some plant matter wet 2.3-3.9: Same as above, but no organics	SM	Y SB-603-0709 @ 12:10	2.1
10 – 15	/	5.0/3.8	11:53	0-3.8: Brown poorly graded med SAND, uniform, wet		N	1.5
15 – 20	/	5.0/4.0	12:00	0-2.6: Brown, poorly graded, med-coarse SAND, wet, loose 2.6-4.0: Same as above, but grayer, some cobbles and gravel		N	1-5
				End of boring: 20' bgs			

Notes

MS and MSD collected from 7-9' interval

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Boring: SB-603

amec	Project: Olin, Wilmington Location: Wilmington, MA Client: Olin	Boring: SB-604 File No.:

Contractor: Boart l CDS	Drilling Method: Sonic	**Definitions:** S = Split Spoon Sample U = Thin Wall Tube Sample R = Rock Core Sample V = Insitu Vane Shear Test q_p = Unconfined Compressive Strength (psf) woh = weight of 140 lb. hammer wor = weight of rods wc = Water Content, percent oc = Organic Content, percent
Operator: S. Groglia	Bore Hole ID/OD: 6"	
Logged By: DLC	Auger ID/OD: 6" casing 4.75" core barrel	
Checked By: [signature]	Sampler: DLC	
Date Start/Finish: ~~3-9~~ 3-6/3-7 2013	Hammer Wt./ Fall: /	
Boring Location: 604	Water Level[3]: ± 10	
Ref. Elevation[1]:		

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	~~Elevation~~ PID
0	Pre-vac	/	9:40	0-5: Brown, med-fine poorly graded SAND and GRAVEL, some cobbles wet	Fill	N	4.0
5		5.0/0.4	9:50	0-0.4: Same as above, but darker. Large cobble at 0.3-0.4.	Fill	N	27.0
10		5.0/4.5	9:55	0-1.9: Brown, ~~med~~ poorly graded med SAND. Lose, damp 1.9-2.1: Gray boulder 2.1-4.5: Brown poorly graded med. coarse SAND, some gravel, wet	SP	Y @ 10:15 9.0-11' x-x OC-SB-604-	6.3
15		5.0/4.1	10:00	0-3.1: Same as above. 3.1-4.1: Same as above, but dry.	SP		1.7
20				End of boring: 20' BGS			

Notes

DUP-5 collected at location ~~(9-11)~~ (9-11' interval)

No distinct organic layer observed. Collected sample at 9-11' in dark brown - brown sand layer

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amec	Project: Olin, Wilmington Location: Wilmington, MA Client: Olin	Boring: SB-605 File No.:

Contractor:	Boart Longyear / CDS	Drilling Method:	Sonic
Operator:	J. Graglia	Bore Hole ID/OD:	6"
Logged By:	PLC	Auger ID/OD:	6" casing 4.75" core barrel
Checked By:	MAM	Sampler:	PLC
Date Start/Finish:	3-6-13 / 3-8-13	Hammer Wt./ Fall:	/
Boring Location:	SB-605	Water Level[3]:	~ 8'
Ref. Elevation[1]:	/		

Definitions:
S = Split Spoon Sample
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
q_p = Unconfined Compressive Strength (psf)
woh = weight of 140 lb. hammer
wor = weight of rods
we = Water Content, percent
oe = Organic Content, percent

Depth	Sample No.	Recovery	Time	Sample Description and Classification	Unified Classification	Analytical Collected (Y/N)	PID
0–5	Pre-voc	/	8:30	Brown, poorly graded, med-coarse SAND and gravel, some large rock frags / cobbles	FILL	N	225
5–10	/	5.0 / 4.8	8:40	0-0.4: Gray, white rock flour, boulder, dry, loose 0.4-2.6: Dark brown fine organic silt, saturated 2.6-3.9: Same as above, but some fine SAND	OL	Y @ 9:00 SB-605-0.0-6.0-xxx	12.2
	/			3.9-4.8: Brown-gray poorly graded med-coarse SAND and GRAVEL, wet	SM		40
10–15	/	5.0 / 4.6	8:50	0-0.9: Same as 3.9-4.8 above 0.9-4.6: Brown, poorly graded med SAND and GRAVEL, some fines, wet	SM	N	1.9
15–20	/	5.0 / 4.1	9:05	0-4.1: Same as above (0.9-4.6 above) but lighter brown End of boring: 20' BGS	SM	N	2.1

Notes

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